June 28, 1943

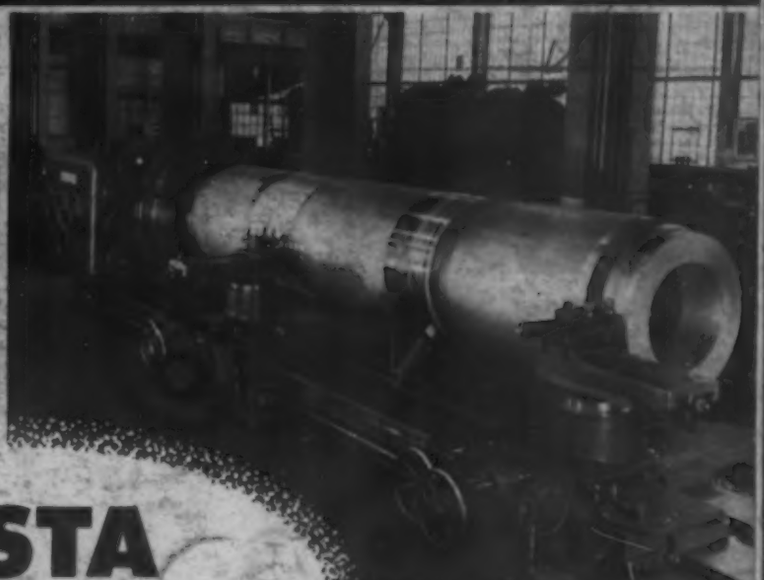
STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

JUN 29 1943

Massive Forged Rotor Shafts for Giant Turbines at the World's Largest Dams



One Piece Forged Steel High Pressure Accumulator Bottle

MESTA FORGINGS

14 Foot Reduction Gear Ring Used in Ship Propulsion, Forged in One Piece by Mesta

Propeller, Stern Tube and Line Shafts for Ships are Produced Complete in the Mesta Plant

The Army-Navy "E" Flag with three stars, flies over the Mesta plant.

BUY MORE WAR BONDS

Group of Mesta Forged Hardened Alloy Steel Working Rolls for Cold Mills

MESTA MACHINE COMPANY . . PITTSBURGH, PA.

A FULL HOUSE BEATS Three of a Kind...

This Absenteeism poster is a nugget from the Reliance suggestion box.

RELIANCE ELECTRIC & ENGINEERING CO.

IVANHOE ROAD • CLEVELAND, OHIO

ELECTRIC MOTORS, MOTOR-GENERATOR SETS, SPECIAL POWER EQUIPMENT

ELECTRIC FERRET

You are looking down a cylinder barrel for a 2000-h.p. aircraft engine.

Here you see the rough-machined forging. When the engine builder gets through with this forging it will be finished to precise dimensions, smooth and bright as a mirror, and extremely hard.

Such a transformation takes time and money. If the last strokes of the polishing machine should uncover injurious imperfections on the smooth inner walls of the barrel, that time and money would be wasted.

To prevent spoilage and rejections *after* machining, Bethlehem gives all Aircraft Quality steel routine representative Magnaflux tests —first when the steel is still in billet form and later (in the case of cylinder barrels) when these rough-machined forgings are ready to ship to the customer.

In principle, Magnaflux is quite simple. The sample is magnetized in a bath of light oil and iron powder, then removed and examined. Hidden flaws are instantly revealed, as the iron powder clings tightly to the surface of the steel directly above any imperfection, indicating its shape, severity, and approximate depth beneath the surface.

The Magnaflux is one of many tests applied by Bethlehem to Aircraft Quality steel. We produce steel for cylinder barrels, connecting rods, gears, cams, and bearings, as well as for dozens of other important aircraft-engine applications. Bethlehem Aircraft Quality Steels are fighting over Europe and the Mediterranean, and over the Pacific.

BETHLEHEM STEEL

MORE STEEL FOR AMERICA'S FLYING FORTRESSES—

A Result of Alliance Cranes

For every step of steel production, from charging the open hearth to shipping the finished products, there's an Alliance long-life crane. Alliance Charging Machines exemplify the high quality found in all Alliance equipment. They stimulate higher production, thus producing more steel for flying fortresses and hundreds of other important implements of war.

Designed and built to do rough and tough jobs, Alliance Charging Machines operate smoothly. The terrific and destructive shocks, often accepted as necessary evils, are absorbed mechanically. Hence, the equipment not only lasts longer without maintenance, but there is also far less strain on the operator. When pushing cars, the side thrust is easily absorbed by expertly designed girder construction. The locking lever remains stationary as the peel is raised and lowered in charging. Furthermore, as the peel enters the charging boxes, heavy springs absorb the extreme shock which would otherwise be transmitted to the equipment and operator. But, the most appreciated feature of all is the patented shock absorbing device at the rear end of the machine. The rear wheels are mounted on slow re-coiling Edgewater springs which resist the severe up and down shock at the rear of the equipment as the charger is loading or unloading, or leveling the charge. Thus, the frequent time out periods, due to operator fatigue caused by repeated vertical shocks, are tremendously reduced. More steel production and lower maintenance costs result. And, it's this type of designing and building that makes all Alliance equipment extremely practical for rough, tough material handling jobs.

★ Alliance ★

LADLE CRANES, GANTRY CRANES, FORGING MANIPULATORS, SOAKING PIT CRANES, STRIPPER CRANES, SLAB AND BILLET CHARGING MACHINES, OPEN HEARTH CHARGING MACHINES

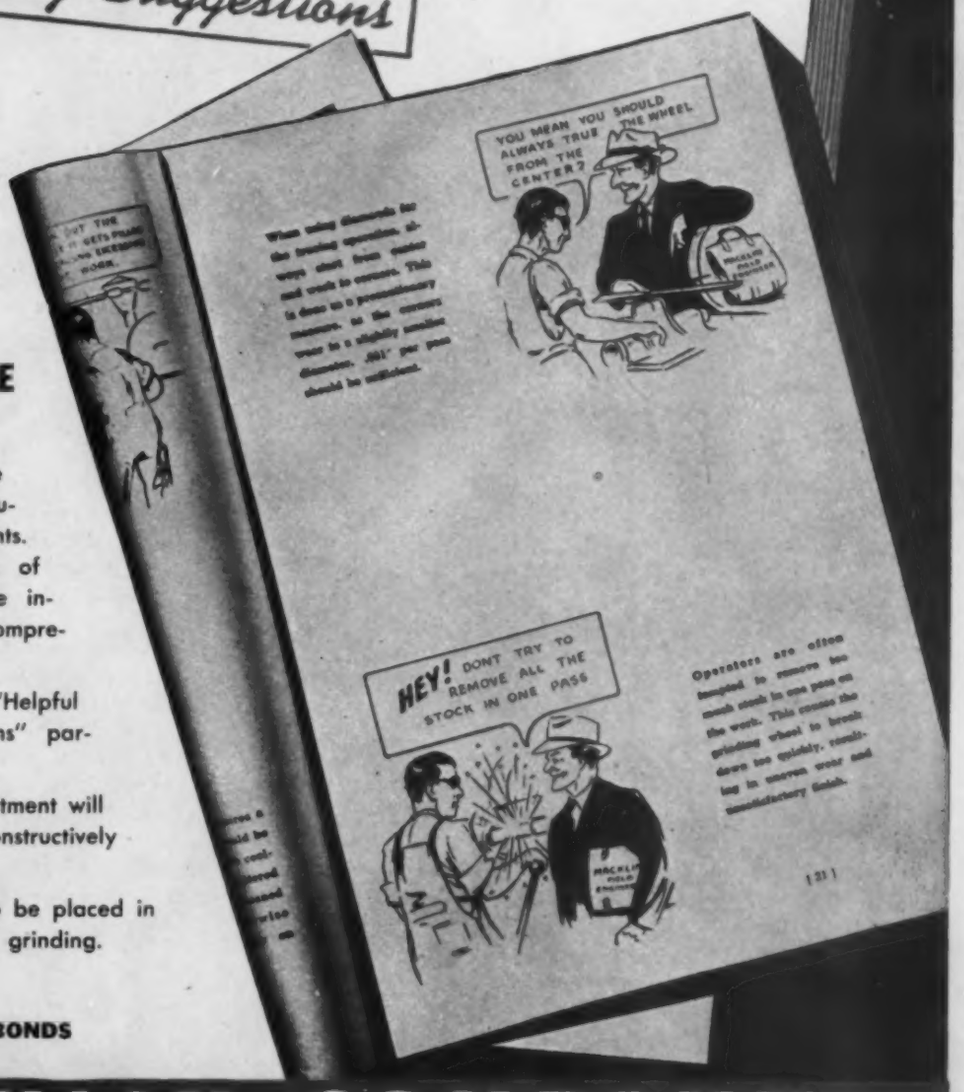
ARMY E NAVY

An Alliance Charging Machine in one of America's large steel plants.

THE ALLIANCE MACHINE CO.
ALLIANCE . . . . . OHIO

MACKLIN GRINDING WHEELS

HELPFUL HINTS and Safety Suggestions


YOU MEAN YOU SHOULD ALWAYS TRUE THE WHEEL FROM THE CENTER?
HEY! DONT TRY TO REMOVE ALL THE STOCK IN ONE PASS
Operators are often tempted to remove too much stock in one pass on the work. This causes the grinding wheel to break down too quickly, resulting in uneven wear and unsatisfactory finish.

FREE INSTRUCTIVE BOOK STILL AVAILABLE

Now in its third printing this Know How illustrated 64 page booklet has proved an invaluable aid to grinding departments. Both large and small users of grinding wheels welcome the informative contents of this comprehensive book.

New grinder hands find "Helpful Hints and Safety Suggestions" particularly useful.

Your entire grinding department will find its many concise facts constructively valuable.

Ask for sufficient copies to be placed in the hands of all interested in grinding.

★

INVEST IN WAR BONDS

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS – JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: – Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

BEHIND THE SCENES

Apologies to the Doctor

■ A lot of fellow gardeners seemed to get quite a kick out of Dr. Horatio K. Bunbottom's garden column which we ran here two weeks ago, and we hasten to correct a very unfortunate error in giving proper credit for this expert down-to-earth advice.

As a matter of fact, the Doctor is an authority on a wide range of subjects and has regularly been giving of his knowledge on such things as "Better Babies" (having been one once himself) and advice to the women war workers on house cleaning. The Doctor is none other than Charles W. Stewart, advertising manager of the Meuhlhausen Spring Corp., Logansport, Ind., who does such an excellent job of publishing that company's monthly employes' magazine, *Spring Times*.

New Draft Classification

■ In the same issue of *Spring Times* in the Doctor's garden column we notice a new draft classification has been set up for the past 38'ers. The new classification is known as 5-B; the "B" standing for Baldness, Bridgework, Bifocals, Baywindows and Bunions.

Get Out Your Paper and Pencil

■ Do you think you're up to a Steel Quiz today? This one comes from the American Iron & Steel Institute and they say a 70 per cent score is a good average. You'll find the correct answers on page 144 but no fair peeking now.

1. The United States has more blast furnaces in operation today than ever before. *True or false.*
2. Extension of a 48-hour work week throughout the steel industry would increase payrolls by (a) $100,000; (b) $100,000,000; (c) $100,000,000,000.
3. Electric furnaces are used primarily to produce (a) *carbon steels;* (b) *pig iron;* (c) *alloy steels.*
4. During the past three years electric furnace capacity has risen (a) 140 *per cent;* (b) 14 *per cent;* (c) 1.4 *per cent.*
5. One of the following breakfast foods is used in manufacturing steel products. Which one? (a) *orange juice;* (b) *bran;* (c) *bacon.*
6. America's steel mills are run by a home front working force that is the numerical equivalent of more than (a) *one;* (b) *three;* (c) *five regular field armies.*
7. In 1942, the American steel industry's furnaces were active (a) 90 *per cent;* (b) 94.5 *per cent;* (c) 99.7 *per cent of the time.*
8. Which of the following states has no iron or steel plants within its borders. (a) *California;* (b) *Wyoming;* (c) *Oklahoma.*
9. Last year, shipbuilders took nearly (a) *twice;* (b) *three times;* (c) *four times* the amount of finished steel consumed by them in 1941.
10. About (a) *one;* (b) *two;* (c) *three tons* of steel go into one of our heavy bombers.

War of Metals

■ And incidentally the steel industry in 1942 poured the equivalent of 24,600 pounds of steel for each man in the armed forces. That was 1500 pounds more per man than the peak year of World War I.

STEEL in the Senate

■ In the mail this week comes a letter from Senator John A. Danaher, Connecticut:

> **I have interestingly read Mr. Kurtz's article entitled "Battle-Scarred Veterans Look To Industry," which ran in the June 14 issue of STEEL. The article commends itself to careful examination particularly by industry leaders.**

It would seem several people down in Washington find STEEL a usable and reliable source of information. Senator Thomas of Oklahoma quoted a rather extensive passage from E. C. Kreutzberg's series of articles on Postwar Planning the other day in the *Congressional Record.*

Safety Poster

■ Here's how the Ampco Metal safety committee hits at plant accidents:

> **The finger that was cut—the shell that was never shipped by the finger that was cut—the soldier who didn't have the shell that was never shipped by the finger that was cut—the battle that wasn't won by the soldier who didn't have the shell that was never shipped by the finger that was cut—the war that was lost by the battle that wasn't won by the soldier who didn't have the shell that was never shipped by the finger that was cut—**
>
> **Hold on there! Whose cut finger was that? It could have been yours.**

New CED Booklet

■ If you haven't a copy of "Target for Peace", the little booklet just published by the Committee for Economic Development, write and get one at Room 3311, Department of Commerce Bldg., Washington. In it is this quotation from Sumner H. Slichter, professor of economics, Harvard University:

> *Undoubtedly security is worthy of a high place in men's ideals. Let us remember, however, that no nation has ever achieved greatness simply by striving for security. . . . More positive and dynamic ideals are needed in order to bring out the best in men. Hence the nation which wishes to be great must place enterprise ahead of security. It must regard innovators, experimenters, starters of enterprises as peculiarly useful citizens and go out of its way to furnish them a congenial and hospitable environment. It must strive to increase the proportion of its citizens who become experimenters and innovators and who make their living, not by getting on someone else's payroll, but by creating payrolls of their own.*

Reprints

■ The excellent article in the June 14 issue by John P. Frey, president, Metal Trades Department, American Federation of Labor, is being reprinted (50,000 copies) by the LaSalle Extension University for further distribution.

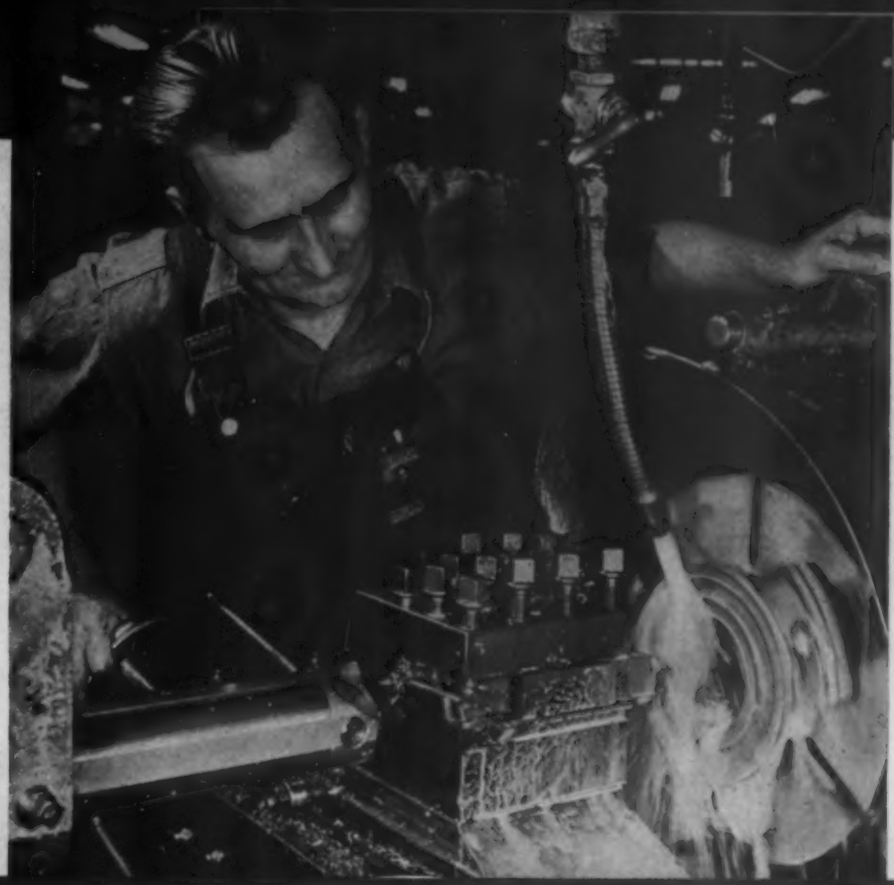
Vol. 112, No. 26, June 28, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Maxico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 43

Ideas for VICTORY

from the Production Lines behind the Firing Lines

A Citation for Men in War Industry



A SIMPLE IDEA...BUT IT STEPPED UP PRODUCTION 40%

In addition to the Victory Pin presented by Warner & Swasey, operator Miller was awarded a war bond by his company, and a citation from W. P. B. He was also given credit, along with other employees who had contributed valuable service to war production, on a national radio broadcast sponsored by The General Motors Corporation.

ONE of the jobs being machined by John Miller, turret lathe operator at the Cadillac Motor Company, is a gear with shaft extension on both sides. As set up, there was not room enough between the spindle and the bar turner in the hex turret to permit square turret operation while the bar turner was cutting. One shaft extension had to be turned before the second could be rough cut and finished.

But John Miller studied the job and found a solution. By pulling more stock out of the spindle and placing cutters in the right side of the square turret, instead of the left side, he was able to combine square turret cuts with hexagon turret cuts, finishing both ends simultaneously, and saving 3 minutes per piece. The rigidity of the hex turret unit on his No. 5 Warner & Swasey made it possible to use this setup, holding .002 accuracy.

Many turret lathe operators have written us, telling how they used the machines and tools at hand to best advantage. Many of these ideas are passed along in Blue Chips, a shop bulletin mailed free to the homes of over 38,000 turret lathe operators. Are your operators getting "Blue Chips"? Just write Warner & Swasey, Cleveland, Ohio.

YOU CAN TURN IT BETTER, FASTER, FOR LESS....
WITH A WARNER & SWASEY

WARNER & SWASEY FOR VICTORY

NEW TOTALLY ENCLOSED TRI-CLAD MOTOR

FULLY ARMORED AGAINST THE ENTRY OF DESTRUCTIVE MATERIALS—RESISTANT TO CORROSION AND EXTERNAL DAMAGE

On this new member of the Tri-Clad motor family, end shields and frame are solid cast iron, smoothly contoured and tightly fitted. Ball bearings are protected by a rotating-labyrinth bearing seal—against damaging dusts or liquids. The leads are sealed in compound in a cast-iron pocket in the frame. Inside, the motor has all the extra-protection features of Tri-Clad open motors, such as Formex* wire.

An outstanding feature of these new motors is that their mounting dimensions are interchangeable with those of open motors of like rating.

For complete information on the totally enclosed Tri-Clad, see your G-E representative, or write to General Electric Co., Schenectady, N. Y.

*Reg. U.S. Pat. Office

FRAME SIZES

Hp	Rpm	Poly-phase	Single-phase
1/2	900	204	
3/4	1200	203	204
3/4	900	224	
1	1800	203	203
1	1200	204	
1	900	225	
1 1/2	3600	203	203
1 1/2	1800	204	204
1 1/2	1200	224	
2	3600	204	204
2	1800	224	

FOR "CRUEL" SERVICE CONDITIONS LIKE THESE

(Meeting requirements of WPB Motor Conservation Order L-221)

DESTRUCTIVE DUSTS*

Where rock dust, metal filings, powdered chemicals, or other finely divided materials are present in destructive quantities.

CORROSIVE FUMES*

Where motors are exposed to corrosive acids and alkalies in liquid or vapor form, such as on mixers in chemical pilot plants.

GUMMY, VISCOUS MATERIALS

In working with paints, oils, syrups, and other materials which might "gum up" the interior of an open motor.

SUPERSATURATED ATMOSPHERES

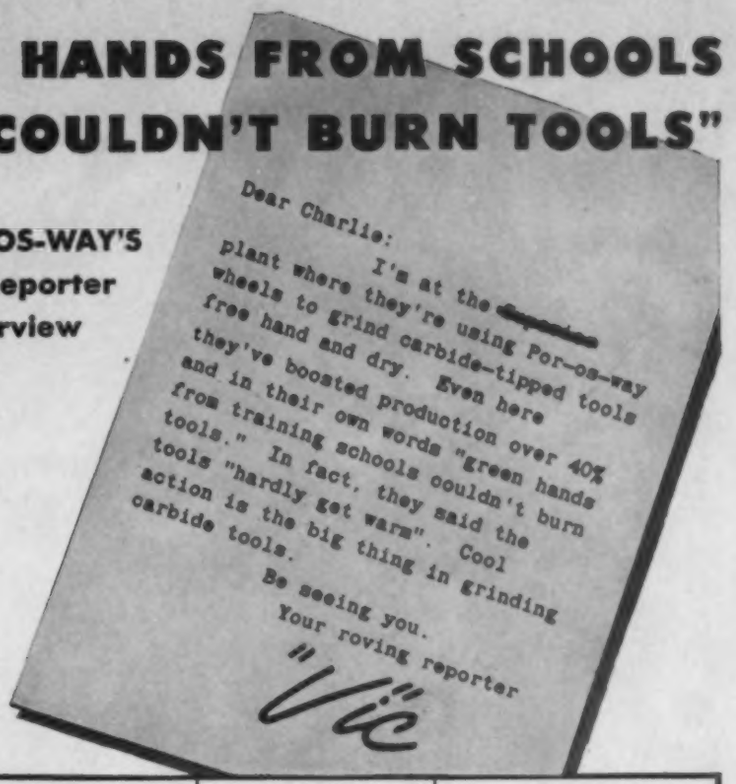
Where motors must operate without fail in areas filled with steam, water vapor, oil droplets. Also out of doors in humid, stormy climates.

* In addition to this *standard* totally enclosed Tri-Clad motor, G. E. can furnish *explosion-proof* types, tested and listed by Underwriters' Laboratories, Inc., for (1) hazardous dusts, such as magnesium dust, coal dust, grain dust, (2) hazardous fumes, such as gasoline.

GENERAL ELECTRIC

"GREEN HANDS FROM SCHOOLS COULDN'T BURN TOOLS"

Quotes POR-OS-WAY'S War Plant Reporter from Interview



Dear Charlie:

I'm at the [redacted] plant where they're using Por-os-way wheels to grind carbide-tipped tools free hand and dry. Even here they've boosted production over 40% and in their own words "green hands from training schools couldn't burn tools." In fact, they said the tools "hardly get warm". Cool action is the big thing in grinding carbide tools.

Be seeing you.

Your roving reporter

"Vic"

THE JOB: Grinding free hand and dry on Excello Tool Grinder carbide-tipped tools 1" x 1" x 6", for turning airplane struts, shaping airplane carburetors, shaping and turning gun turrets for planes.

THE WHEEL: Por-os-way 10" x 2" x 2" C54KV3

All facts and figures given are taken from an actual field survey made by a Por-os-way correspondent

THE RECORD	POR-OS-WAY WHEEL	FORMER WHEEL
Number tools per hour per man	37	26
Number of dressings required	NONE	Every 2 hours
Pieces per wheel	888	520
Stock to be removed	.000"—.250"	same
Wheel life	24 hours	20 hours
Depth of cut	.002"—.010"	Tools burned when jammed into wheel
Number of passes required	12	48
Amount of rejects	0	50 per day (scrapped)
Increase in production	42.3%	

WRITE, *for complete booklet "Facts About Por-os-way". The address is 436 Wheatland Street, Phoenixville, Pennsylvania.*

2 TO 5 TIMES MORE WAR PRODUCTION PER MAN PER MACHINE

POR-OS-WAY* *a new* RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH, CLEVELAND, DETROIT, LOS ANGELES

PHOENIXVILLE, PENNA.
Western Gateway to VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.

COPYRIGHT, 1943, A. P. de Sanno & Son, Inc.

The Gestapo would kill to get this information

It's yours simply for the asking!

TO you men, who are today using steel in a hundred new ways —who must perform the veritable miracles of production upon which the success of our war effort depends—to you we offer practical assistance in the use of steel that will make your job easier.

Here for *your* use are the very latest wrinkles in the wartime application of steel that keen metallurgical skill and American manufacturing ingenuity have developed.

Much of this information is of such a "hush-hush" nature that we dare not be specific here. But this we can say—most of it is based on the solution of knotty problems in war production such as you face every day, and therefore should be of inestimable help to you.

Closely guarded in our confidential files are actual case histories that will help you short-cut your fabricating processes—that will make steel do more for you than it has ever done before, or do it better.

Here is the kind of information that Axis agents would stop at nothing to get their hands on.

It is our responsibility to see that this information is distributed where it will do the greatest good. It is your responsibility to use it to America's advantage.

ONE AIM . . . VICTORY . . . BUY BONDS!

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

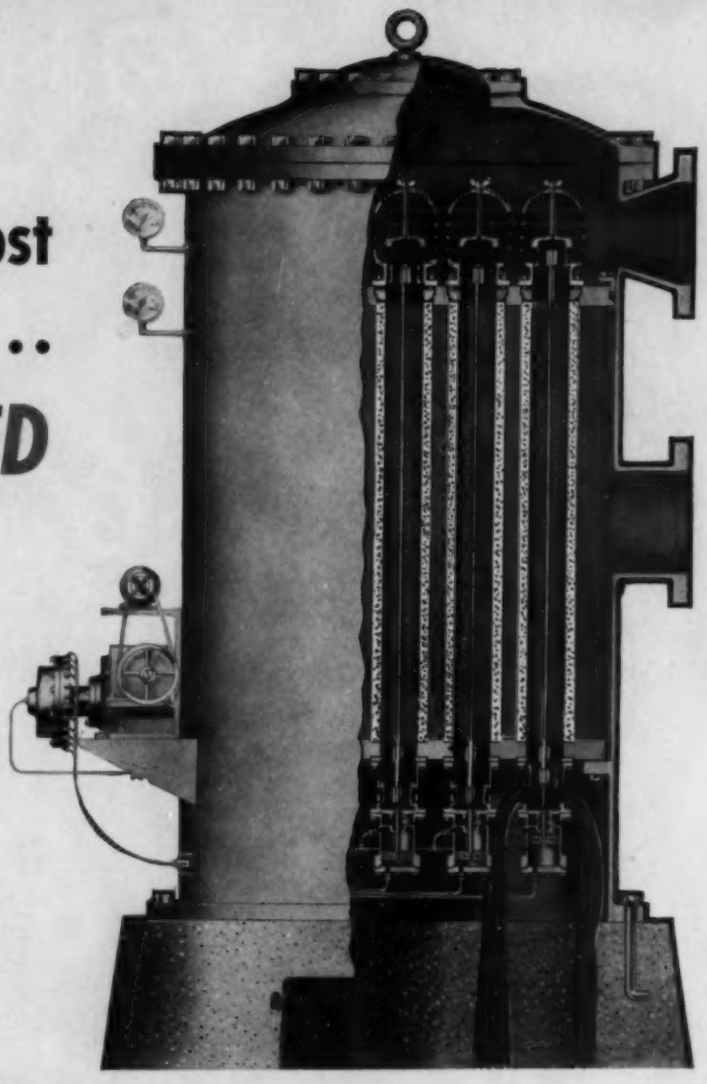
UNITED STATES STEEL

USS

Automatic WATER FILTERS

High maintenance cost from dirty flood water...

CAN BE ELIMINATED



● Your bearings and rolls will last longer with FILTERED WATER and your hydraulic equipment will give more hours of trouble free service.

The success of ADAMS AUTOMATIC filters where others have failed is due to low velocity filtration. Where outdated equipment used 5 sq. ft. of filtered area, ADAMS AUTOMATICS use 100 sq. ft. For steel mill service, we recommend Adams monel PORO-SCREEN tubes capable of removing particles 4/1000" and larger. The multiple tube design has no moving clearances and is fully automatic. One tube backwashed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of backwashing—flood water more frequent—normal water less frequent. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.

★ R. P. ADAMS COMPANY, INC. ★

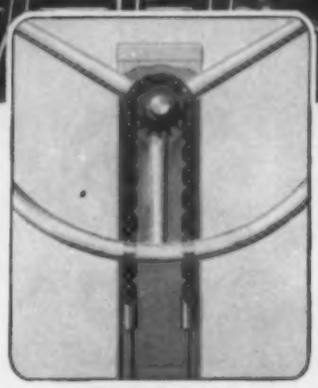
75 CHICAGO STREET, BUFFALO, N. Y.

ADAMS PORO-STONE AND PORO SCREEN FILTERS

Flying Drives!

New, Improved Link-Belt Silent Chain increases efficiency of Aircraft Controls!

Chain can fight, too. It's doing a big war job in many types of fighting equipment as well as on the production front. New types—designed for high precision performance—are helping make our planes, our tanks and other vital weapons the finest in the world. Link-Belt engineers have helped solve many critical design and production problems by their ingenious and efficient applications of chain. Link-Belt, through its vast experience and extensive producing facilities, has developed and expanded its line of chains and sprockets into scores of standard types and sizes for every conceivable purpose. Wherever chain is needed—for power transmission or for conveying—remember, it's Link-Belt for Chain!



Link-Belt Precision-Built Aircraft Silent Chain is a special development, to meet the needs of the aviation field. The distinctive tooth and link form of this improved chain minimizes the effect of chordal action and assures smooth, positive operation even over extremely small sprockets.

8089-B

LINK-BELT COMPANY

Chicago Philadelphia Indianapolis Atlanta Dallas San Francisco Toronto
Pittsburgh Cleveland Detroit

Branch offices, warehouses and distributors in principal cities

LINK-BELT for CHAIN

Scrap is needed to make steel. Steel, more steel, is needed by the Armed Forces to bring Victory.

If you have old machinery that can't be used to produce War Materials, turn it over to your local Scrap Dealer. He will see that it reaches the steel producers. All trimmings and short ends of steel you have left over should be collected and stored until such time as you have a full load. Then call your Scrap Dealer. Make sure he picks it up, at once. In this way you can aid the steel producers, our Armed Forces and yourself.

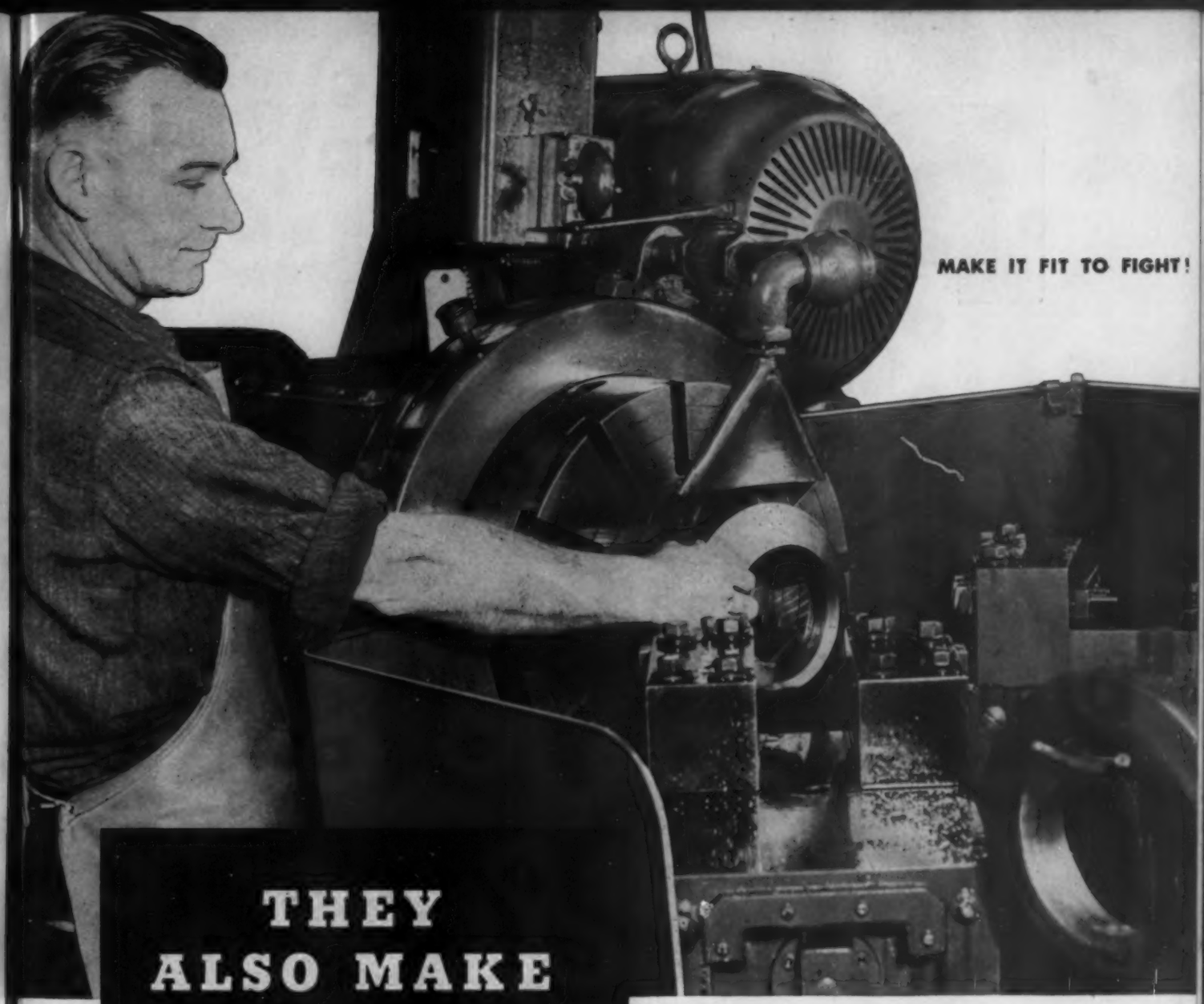
Keep the Scrap coming.

WEIRTON STEEL COMPANY—WEIRTON, WEST VIRGINIA

Sales Offices in Principal Cities

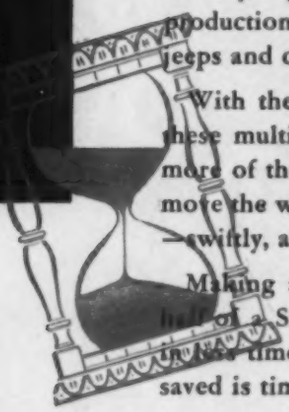
division of **NATIONAL STEEL CORPORATION**

Executive Offices, Pittsburgh, Pa.



MAKE IT FIT TO FIGHT!

THEY ALSO MAKE *Time*



GISHOLT SIMPLIMATICS provide the extremely high speed essential in the mass production of parts for planes, tanks, trucks, jeeps and other vital war equipment.

With their automatic machining cycles, these multiple-cutting lathes require little more of the operator than to load and remove the work. The machine does the rest —swiftly, accurately.

Making a wide variety of parts is only half of a Simplimatic's job. Making them in less time is the other. For in war, time saved is time earned.

GISHOLT MACHINE COMPANY

1217 East Washington Avenue • Madison, Wisconsin

Look Ahead... Keep Ahead... With Gisholt Improvements in Metal Turning

TURRET LATHES · AUTOMATIC LATHES · BALANCING MACHINES

POUR

TYCOL

SCIENTIFICALLY

STEEL

POINT*

* This is No. [illegible] of a series of informative messages concerning the meaning and significance of commonly used tests and terms employed to describe the characteristics of lubricating oils.

TIDEWATER LUBRICANIA

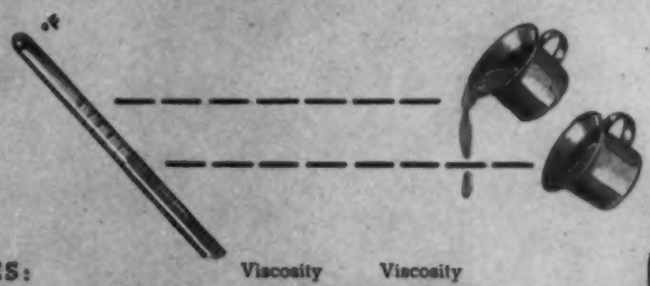
DEFINITION: The pour point is the lowest temperature at which the oil will pour or flow when chilled without disturbance under definite prescribed conditions.

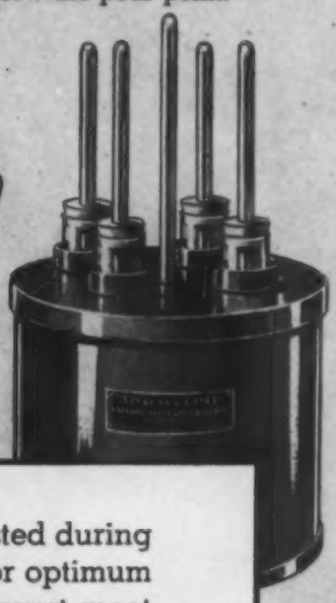
TEST: Following a carefully prescribed procedure with standardized equipment, the oil is chilled in a test jar or a corresponding 4 oz. sample bottle. At each oil temperature reading, taken at 5° F. intervals, the test jar is removed and tilted just enough to ascertain whether or not the oil is still fluid.

A temperature point will be reached at which the oil shows no movement when the test jar is held horizontally for exactly 5 seconds. The pour point is the temperature 5° F. above this "non-fluid" point.

SIGNIFICANCE: The pour point is an indication of the temperature below which it may not be possible to pour oil from its container, or below which it may not flow in gravity lubrication systems. This may be due either to partial separation of wax crystals forming a spongy network or to congealing of the oil itself.

Therefore the pour point bears no relation to the viscosity of the oil at higher temperatures. Neither does it indicate the pressure flow, or the tendency to "channel" at temperatures below the pour point.





EXAMPLES:	Viscosity at 210° F.	Viscosity at 32° F.	Pour
Paraffine Base Lubricant....	70	12,000	25° F.
Napthenic Base Lubricant..	70	50,000	0° F.

Tycol lubricants are rigidly controlled and tested during manufacture to the required characteristics for optimum performance. Among many other tests they must meet the pour point requirements of the individual application.

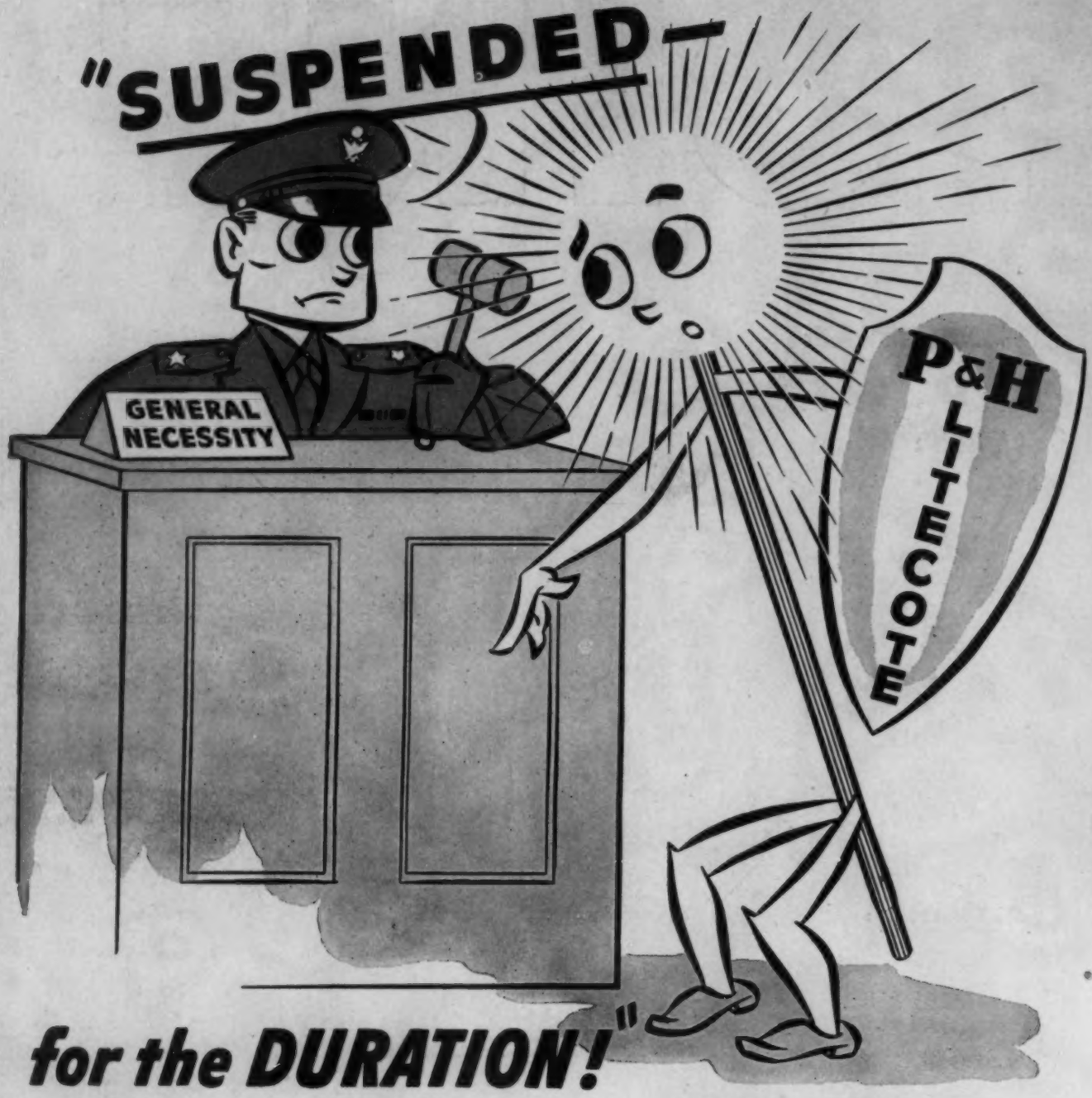
DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

TIDE WATER ASSOCIATED OIL COMPANY

Eastern Division: 17 Battery Place, New York
Principal Branch Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.
MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

INDUSTRIAL LUBRICANTS

ENGINEERED FOR EVERY INDUSTRIAL USE



for the DURATION!"

Nothing against you, Litecote. You've always been a good electrode. But this is war! And your place must be taken over by other electrodes more urgently needed in war production —in arsenals, shipyards—and for maintenance of vital machinery on the home front.

You're in retirement until the war is over. Meanwhile, the production of P&H Alloy Electrodes is being increased to supply the demand for more and more uses in hard surfacing, in resistance to wear, impact and abrasion, for welding stainless steels, 4-6% chrome steels, armor plate, etc.

Procedures for P&H Alloy Electrodes are available on request.

P&H *Alloy* ELECTRODES

P&H builds a complete line of A.C. and D.C. welders — all with single control. All P&H machines are rated on W.S.R. which is actual delivered output.

ARMY (E) NAVY

A new star has been added to P&H's award for excellence in war production.

General Offices: 4411 W. National Avenue, Milwaukee, Wis.

HARNISCHFEGER
CORPORATION
WELDING ELECTRODES · MOTORS · HOISTS P&H ELECTRIC CRANES · ARC WELDERS · EXCAVATORS

Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.

Illustration is approximately full size.

Sorry, we can't tell you what this is—or what it does. But it IS a beauty, isn't it? We *can* tell you that it started out as an Anaconda Hot Pressed Part, and that it was machined to its extremely close limits by the E. W. Bliss Co. It *should* give you an idea of what can be accomplished in the production of complicated parts of intricate design. Anaconda Hot Pressed Parts are strong, tough, close-grained and readily machined. They can be made of wrought copper, brass, bronze or special copper alloys . . . and design possibilities are almost unlimited.

THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Conn.

ANACONDA

Anaconda Copper & Brass

More about Anaconda Hot Pressed Parts and Pressure Die Castings on the following page.

Here's how to get a headstart on a Finished Product

Alexander F. Jenkins, President, The Alexander Milburn Company, manufacturers of welding and cutting apparatus, has this to say about Anaconda Hot Pressed Parts:

"Welding and cutting tool equipment is susceptible to a great deal of heat, gas pressure and rough usage. We have found Anaconda Hot Pressed Parts the only suitable material having the necessary fine-grain, leak-proof structure for such parts of welding and cutting tool torches. They require a minimum of finishing and possess physical properties which are highly satisfactory."

"Hot Pressed Parts...Require a Minimum of Finishing"

Point for point, this check list will help you compare your present materials with Anaconda Hot Pressed Parts,

1. Consistently accurate in dimension.
2. Freedom from internal defects.
3. Gas, air and water-tight.
4. Twice the strength of sand castings.
5. Uniform, dense grain structure.
6. Smooth, fine-texture finish.
7. Readily machined—very little scrap.
8. No sand—long tool life.
9. Available in copper, brass, bronze and special copper alloys.

If the production of complicated parts of unusual design is causing you concern, Anaconda Hot Pressed Parts may be the answer. They have proved to be an economical short-cut to a finished product in many instances. The check list at the left will help you compare Hot Pressed Parts with the sand castings, permanent mold castings, or other forms of material you may be using. If the use of a Hot Pressed Part indicates a possible cost saving, an improved product, a production speed-up, or release of important machining equipment, we'll be glad to talk it over.

See how quickly this Pressure Die Casting becomes a Finished Airplane Part!

On the left is an Anaconda Pressure Die Casting as supplied by The American Brass Company to the Dominion Electrical Mfg., Inc. This unique shaped part is a component of an Airspeed Tube, mounted on the wing to measure the speed of the plane. Drilling, tapping and slotting produce a finished part, as shown at the lower left, with a minimum of time, material and scrap. Anaconda Pressure Die Castings have most of the advantages of other types of die castings—*plus* higher strength, higher resistance to impact, greater hardness and ductility, and a high degree of corrosion resistance. While they do not have as dense a grain structure as Hot Pressed Parts, they are adaptable to more intricate coring and a wider range of design. Publication B-9 tells more about both of these Anaconda Products. Shall we mail a copy?

THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut *Offices and Agencies in Principal Cities*

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

ANACONDA

Anaconda Copper & Copper Alloys

MORE PRODUCTION PER MAN HOUR
These smaller size Niagara Inclinable Presses offer the same design features of larger Niagara Models. The instant acting 14-point sleeve clutch is an important factor in increasing the output per man hour. It is possible that one or more of these presses can help you in speeding up production of urgently needed wartime material.
A1¼
A1½
A1¾
A2
A2¼
A2½
NIAGARA
NIAGARA MACHINE & TOOL WORKS
BUFFALO, N. Y.
District Offices: DETROIT — CLEVELAND — NEW YORK

BUY UNITED STATES WAR BONDS AND STAMPS

Arm Your Screw Driving Army for SPEED TACTICS

SPEED-UP WITH PHILLIPS SCREWS!

Give your assembly line Phillips Recessed Head Screws and you'll give them the ammunition to clean up lagging assembly jobs on the double-quick!

In most cases, change-overs to Phillips Screws have cut driving time in half! All of the screw driving troubles that slow-up work are eliminated by the Phillips Recessed Head. The scientific recess, by automatically centering the driving force, prevents fumbling, wobbly starts . . . prevents slant-driven screws . . . burred and broken screw heads . . . dangerous screw driver skids.

The Phillips Recess lends "old-hand" skill to the newest newcomer . . . makes fast, faultless driving automatic. It permits power or spiral driving on almost any job.

They cost less to use! Compare the cost of *driving* Phillips with that of slotted head screws. You'll realize that the price of screws is a minor item in your total fastening expense . . . that it actually costs less to have the many advantages of the Phillips Recess!

KEY TO FASTENING SPEED AND ECONOMY

The Phillips Recessed Head was scientifically engineered to afford:

Fast Starting – Driver point automatically centers in the recess . . . fits snugly. Screw and driver "become one unit." Fumbling, wobbly starts are eliminated.

Faster Driving – Spiral and power driving are made practical. Driver won't slip out of recess to injure workers or spoil material. (Average time saving is 50%.)

Easier Driving – Turning power is fully utilized by automatic centering of driver in screw head. Workers maintain speed without tiring.

Better Fastenings – Screws are set-up uniformly tight, without burring or breaking heads. A stronger, neater job results.

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

21 SOURCES

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N. H.

have you added up the facts on

...tron power conversion?

1. *No major rotating or moving parts.*
2. *High short-time overload capacity.*
3. *Lightweight, compact, durable.*
4. *High Efficiency over entire load range.*

The above characteristics, found only in the Ignitron Rectifier, add up to tangible advantages for d-c power users.

Ignitron operating costs are low. Simplified automatic operation, low arc drop loss, the elimination of high starting demand and absence of any major moving parts hold operating and maintenance costs to a minimum.

Load shifting is seldom necessary with an Ignitron. It will handle high load swings easily, making it adaptable to widely diversified service conditions.

Installation is easy, too. No special foundations are required. With its lightweight construction and vibrationless operation, an Ignitron can be installed on any level concrete floor of reasonable strength.

Equally important is the uniformly high efficiency of power conversion with the Ignitron, which can operate at full capacity 24 hours per day.

These are a few of the reasons why more than 2,000,000 kw have already been installed. Ignitron may be the solution to your d-c power problems. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

MORE THAN 2,000,000 KW serving war industries — in the electrochemical, steel, mining and transportation fields.

in the steel industry

The inherent advantages of the Ignitron Rectifier make it ideally suited for steel mill service. The outstanding feature is its practically straight-line efficiency from light load to overload. Also, since there are no major moving parts to be affected by dirt and grit the Ignitron requires less maintenance. Operation can be made completely automatic to provide unattended service.

For further information about the Ignitron Rectifier, write Dept. 7-N for your copy of Book B-3024.

J-10243-1

Westinghouse *Electronics at Work*

IGNITRON RECTIFIERS

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

LEAD—The Available Metal

The protection of steel with lead is not a particularly new idea. Terne plate, a steel plate coated with a tin-lead alloy, has been in use for a great many years.

Since the war has brought about a shortage of tin, steel shapes are being coated with lead alone, and sometimes a very small amount of tin, and/or antimony, is added to advantage.

Lead, the metal, is practically everlasting. Lead pipe, in excellent condition, was excavated in Rome in 1907. It had been put in service over 1800 years ago during the rule of Emperor Caesar Augustus Vespasian.

The American Society for Testing Materials placed samples of lead-coated steel hardware on racks at three localities, fifteen years ago, and samples of lead-coated steel wire at eleven locations throughout the country, six years ago, to test them against atmospheric corrosion. The favorable showing of lead against other rust-inhibiting materials, in these tests, indicates that lead, of which there is an abundant supply, should be used much more extensively than it is even now. We are told that lead-coated steel has come to stay.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK • ELdorado 5-3200

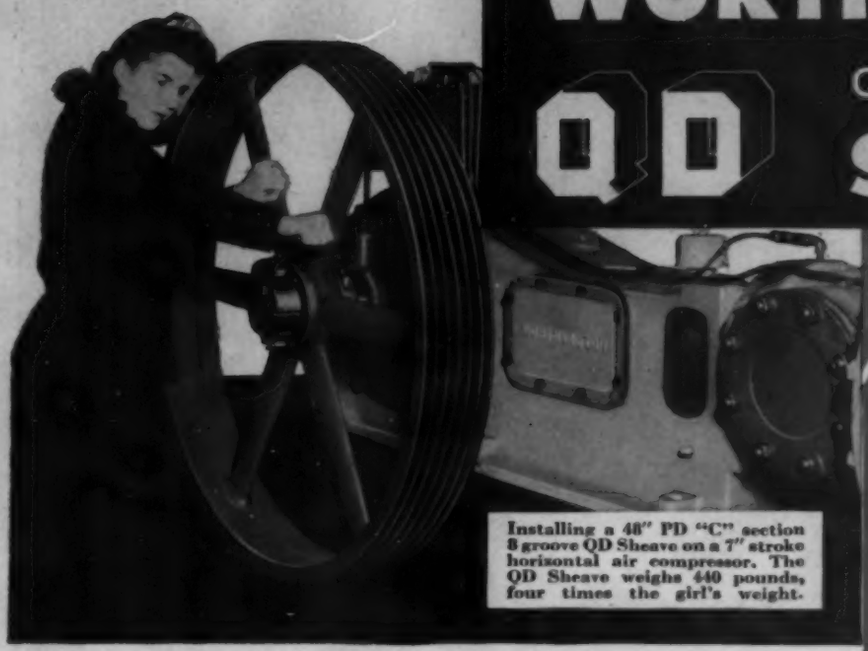
Lead *Zinc Oxide* *Antimony*

Zinc *Antimonial Lead* *Cadmium*

THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES

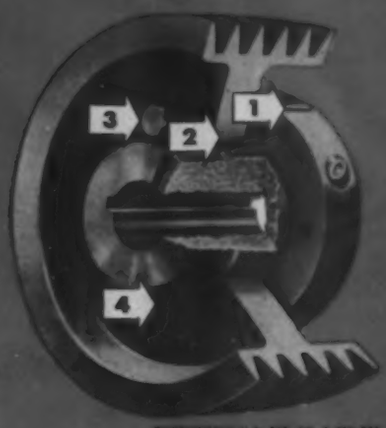
WORTHINGTON

QUICK DETACHABLE QD SHEAVES



Installing a 48" PD "C" section 8 groove QD Sheave on a 7" stroke horizontal air compressor. The QD Sheave weighs 440 pounds, four times the girl's weight.

Superior Advantages of the QD Sheave Design Cost No More



1 Split Hub for easy mounting or removal from the shaft.

2 Tapered Fit between split hub and rim for easy mounting or removal of rim from hub.

3 Pull-up Bolts which hold the rim onto tapered split hub for tapered friction drive assembly and positive press fit on the shaft.

4 Tapped holes in rim for using pull-up bolts as jack screws to free the tapered friction fit when detaching the rim.

NOW AVAILABLE for DriveN as well as DriveR applications

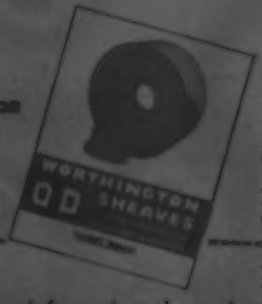
Women assembling GIANT DRIVEN SHEAVES, no longer are an oddity to be headlined in Ripley's "Believe It Or Not." INEXPERIENCED "GREEN" HELP in assembly plants find these sheaves simple to mount.

The problems of assembling and maintaining Vital DriveN and DriveR machinery have been greatly simplified with the introduction of the Worthington patented QD Sheave with its "Easy To Get On—Easy To Get Off, YET ALWAYS TIGHT ON THE SHAFT" features.

The QD Sheave design has now been incorporated into a complete range of DriveN and DriveR sizes that will accommodate 10,000 drive combinations up to 150 horsepower from stock.

One demonstration will convince you that a wrench and inexperienced hands are all that are needed to install or remove a QD Sheave, regardless of size. Arrange for your demonstration today—write or call the Worthington Multi-V-Drive dealer or the Worthington District Office in your territory.

Mail the Coupon NOW for this New Bulletin



I would like more information about the Time, Labor, and Material Saving Advantages of the Worthington QD Sheave.

Name _____ Title _____

Company _____

Address _____

City _____ State _____ County _____

Product Manufactured _____

MV3-10

COMPLETE DRIVES **WORTHINGTON MULTI-V-DRIVES** SHEAVES OR BELTS ONLY

WORTHINGTON PUMP & MACHINERY CORPORATION • GENERAL OFFICES: HARRISON, N. J.

WHAT *Park* LABORATORY CONTROLLED PRODUCTS MEAN TO YOU

SPECIALISTS IN HEAT TREATING SINCE 1911

WITH the recent installation of additional facilities, the Park Chemical Company now has one of the most modern heat treating and chemical laboratories in the country. This serves to provide customers with even better metallurgical and chemical analysis of their heat treat problems. The adherence to LABORATORY CONTROLLED PRODUCTS has already established for Park an enviable reputation for selling products that are pre-tested for each particular job. By using Park's LABORATORY CONTROLLED PRODUCTS manufacturers have eliminated costly trial and error methods on production lines, thereby effecting definite savings in their heat treating departments. Why don't you find out how Park's LABORATORY CONTROLLED PRODUCTS can benefit your company? A letter to our sales department will bring you complete information regarding Park Heat Treating Products.

A Park research metallurgist running a carburizing test.

Park maintains laboratory control of all raw materials and finished products in this chemical laboratory.

Section of experimental heat treat where proper heat treat procedures are determined.

Park

PARK CHEMICAL CO.

● Liquid and Solid Carburizers ☆ Cyanide, Neutral and High Speed Steel Salts ☆ Lead Pot Carbon ☆ Charcoal ☆ Coke ☆ No Carb. ☆ Carbon Preventer ☆ Quenching and Tempering Oils ☆ Drawing Salts ☆ Metal Cleaners ☆ Liquid Grain Cement

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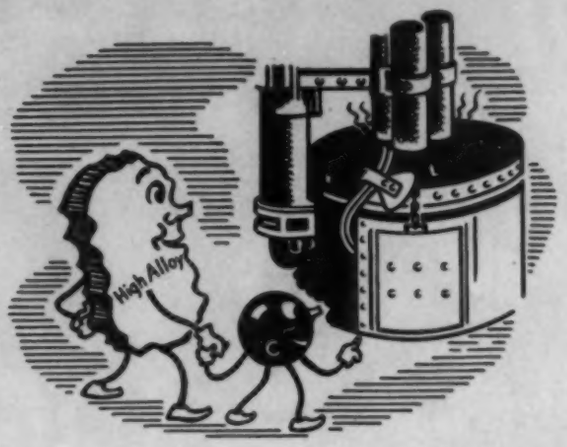
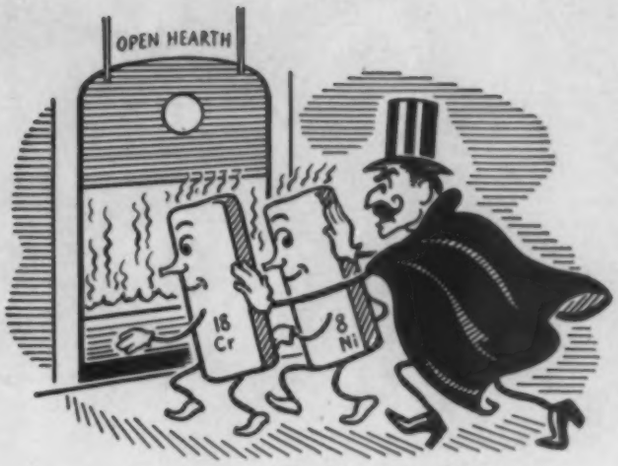


CONSERVE HIGH-ALLOY, LOW-CARBON SCRAP

BY USING IT FOR HIGH-ALLOY, LOW-CARBON STEELS.

DON'T WASTE VALUABLE STAINLESS STEEL SCRAP

BY USING IT IN THE OPEN HEARTH FURNACE.



• Alloy steels are among our most critical materials today. To insure your supply of critical alloys for alloy steel . . . to prevent the waste of tons of alloys lost as residual content in plain carbon steels...conserve alloys by using scrap to the best advantage.

While alloy steel borings and turnings are more difficult to use than heavier scrap, they can be used efficiently if they are crushed or briquetted. The savings made possible by reusing critical alloys will usually more than pay for the cost of conditioning the scrap.

As a producer of ferro-alloys and alloying metals used in the production of steel, Electro Metallurgical Company is concerned with the conservation of these vital materials. From their fund of metallurgical information, Electromet's technical service staff can advise you on problems encountered in the manufacture of alloy steel. Your request for this service will not obligate you in any way.

• • •

Electromet Ferro-Alloys and Metals are available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada they are sold through Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

"Electromet" is a registered trade-mark of Electro Metallurgical Company.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street New York, N. Y.
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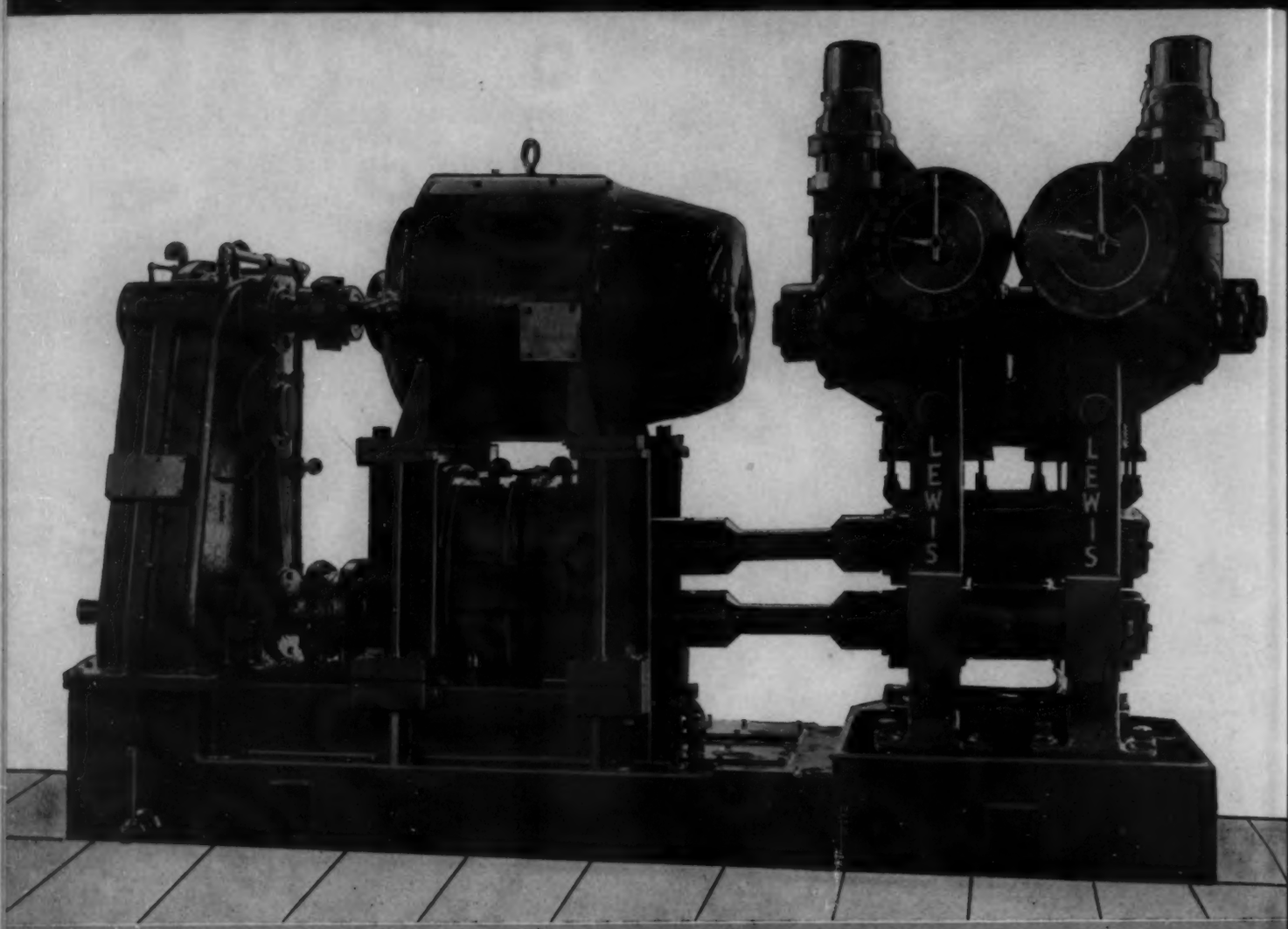
Electromet
Trade Mark
Ferro-Alloys & Metals

THIS LEWIS MILL SAVES FLOOR SPACE



The photograph shows a good example of how Lewis has designed a sturdy Six Stand Tandem Cold Strip Mill to combine precision rolling with minimum bulk. This mill is equipped throughout with anti-friction bearings. It has universal spindles. Screwdowns are motor operated.

Lewis Rolling Mill Machinery is always abreast with the latest improvements in rolling mill practice.

LEWIS
Rolls and Rolling Mill Machinery step up tonnage

LEWIS FOUNDRY & MACHINE
DIVISION OF BLAW KNOX CO.
PITTSBURGH, PA.

What's Behind the Trade Mark?
QUALITY
TRADE MARK
YOUNGSTOWN
SERVICE
Freedom of Initiative
AT the end of the 1900 - 1905 period, the operations of The Youngstown Sheet and Tube Company were highly profitable. Some corporations might have been content to rest upon their laurels at this time. The Shareholders of not a few companies would have preferred to enjoy a period of large profits and proportionate dividends than to risk for a greater future by further expansion. This, however, was not the spirit of the men of action and initiative who planned the future of this company.
In 1906 the new steel plant, Bessemer converters, rolling mills, etc., were placed in operation. In 1907 coal lands totaling 1348 acres in Greene County, Pa. were purchased; new tube mills with coupling shop and additional manufacturing facilities were installed and construction of Blast Furnaces authorized. In 1908 an operating rod, wire and nail plant adjacent to the original plant was acquired and the new blast furnaces were completed.
A large part of the new construction and additions to the production facilities of the company were financed from profits. To supplement the necessary financing, the capital stock was increased in 1907 from $4,000,000 to $6,000,000.
The American principle of freedom of initiative which nurtured the growth of this great industrial organization has been the life blood of this nation. With this freedom kept alive, we may all expect to share in making post-war America happier and stronger than we have ever seen it.
The YOUNGSTOWN
SHEET AND TUBE COMPANY, Youngstown, Ohio
Manufacturers of
CARBON · ALLOY AND YOLOY STEELS
Pipe and Tubular Products · Sheets · Plates · Conduit · Bars · Tin Plate
Rods · Wire · Nails · Tie Plates and Spikes · Alloy and Yoloy Steels

FOR HEAVIEST FORGINGS

WHAT is your heaviest forging job? Is it cogging down ingots? Working heavy billets? Is it working with tough tool steels? For these and other tough flat die forging jobs, we built this broad base, pyramid-like Double Frame Steam Hammer. It provides ready accessibility to the die from all four sides and ample height under the arch. Like all Erie's it features speed and power with hair-trigger control. No forging job is too tough or too big for an Erie.

ERIE FOUNDRY CO • ERIE, PA.

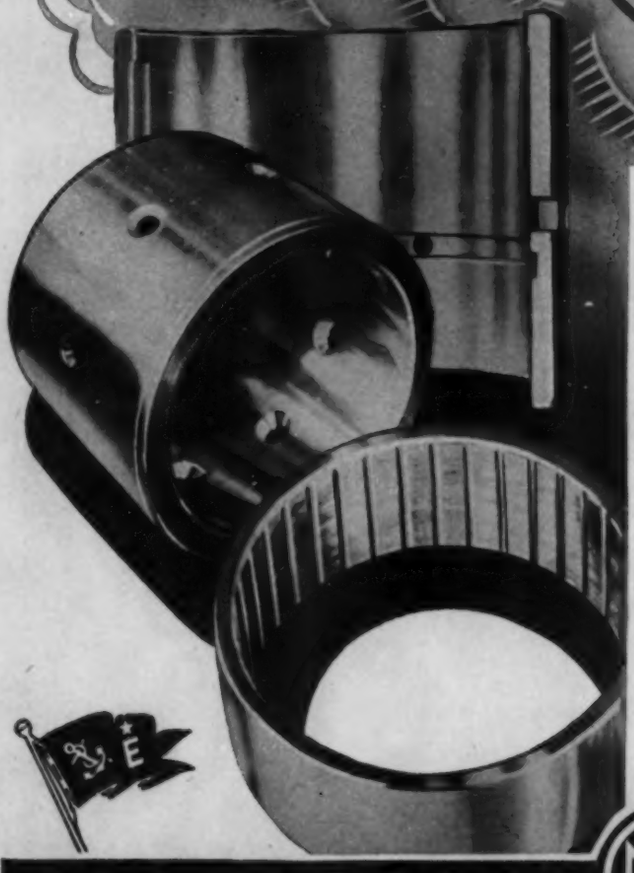
The Erie Hammer illustrated was specially built to handle a heavy forging operation vital to the United States Navy

Erie's complete facilities are devoted to war work.

ERIE

ERIE BUILDS Dependable HAMMERS

GIVE US A SEAT ON YOUR PLANNING COMMITTEE



After this war, the first orders will go to those who have something better to offer.

Call us in for your planning discussions. Our research laboratories, our chemists and metallurgists, our experienced engineers are at your disposal. You will benefit from almost 70 years' experience in producing

N·B·M

NON-FERROUS CASTINGS
BRONZE BEARINGS AND BARS

NATIONAL BEARING
METALS CORPORATION
ST. LOUIS • NEW YORK

PLANTS IN: ST. LOUIS, MO. · PITTSBURGH, PA. · MEADVILLE, PA. · JERSEY CITY, N. J. · PORTSMOUTH, VA. · ST. PAUL, MINN. · CHICAGO, ILL.

GRAVER

Fabricated STEEL PLATE *Equipment*

In one of the most modern steel fabrication plants in the country, Graver is building steel plate equipment of all types—stills, towers, vacuum and pressure vessels, storage tanks, welded machine parts, etc.—to meet the needs of hundreds of varied industries.

With equipment for fabricating pressure vessels in accordance with API-ASME specifications, together with complete x-raying and stress relieving facilities, Graver offers a service that will comply with the most exacting requirements.

Whatever your needs may be, send us your prints and specifications. We'll quote immediately—and there's no obligation.

GRAVER TANK & MFG. CO., INC.

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NEW YORK • CATASAUQUA, PA. • CHICAGO • TULSA

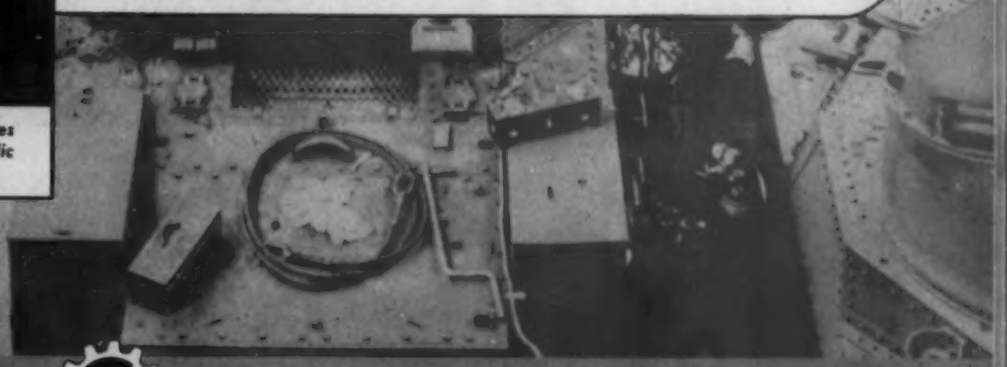
Conserve Man Power today...

WITH CROSS SPECIAL MACHINES

CROSS 3 WAY *Milling Machine*

Demand for greater volume cannot be satisfied with the lone expedient of additional man hours. Manufacturers who were forced to improvise for a quick start are now increasing production with special machines that consolidate many operations. Cross analyzes manufacturing problems, develops new methods, engineers and produces special machines for doing better work faster. A typical application: the Cross 3-way profile miller which simultaneously finishes three faces on tank transmission housings with improved accuracy and saves 6 man hours per piece.

Cutter spindles are mounted in large circular cradles that oscillate in synchronized relation with hydraulic cross feed of the heads.



FROM PRESS ASSOCIATION, INC.

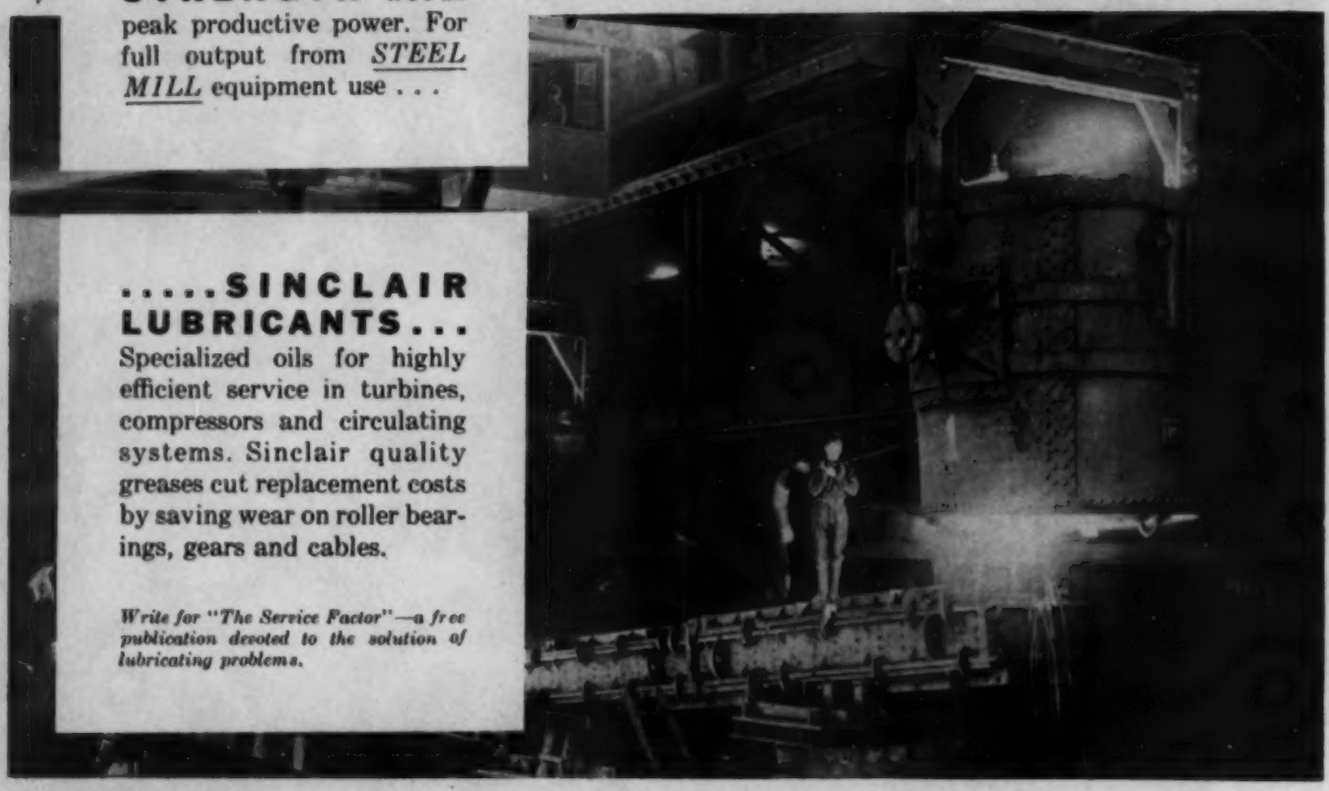
CROSS GEAR & MACHINE CO.

Established in 1898

DETROIT, MICHIGAN, U.S.A.

S-1

.....FIGHTING STRENGTH needs peak productive power. For full output from *STEEL MILL* equipment use . . .



.....SINCLAIR LUBRICANTS...

Specialized oils for highly efficient service in turbines, compressors and circulating systems. Sinclair quality greases cut replacement costs by saving wear on roller bearings, gears and cables.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

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● "How to do it?" "What to use?" If the conditions of service are unusually severe in nature, the answer probably is Republic ENDURO Stainless and Heat-Resisting Steels.

ENDURO is truly the "how to do it" metal—because it does so many things unusually well.

It resists the attack of corrosion, wet or dry, acid or alkaline. It resists scaling and oxidation at elevated temperatures. It is high in strength—high in creep values. It is clean and sanitary—does not contaminate—is easy to clean. And it fabricates readily to desired shapes.

The burner parts above, made of ENDURO HC (Type 446) illustrate heat-resisting and fabricating qualities of this problem-solving material. Other illustrations plus detailed information on corrosion- and heat-resistance, physical, mechanical, electrical, heat-treating, welding, machining, drawing and stamping properties of the popular ENDURO analyses will be found in the ENDURO Booklet No. 361.

Write for a copy. If you would like specific data on any particular type or on the use of ENDURO for some certain application, ask for it at the same time.

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REPUBLIC

Enduro STAINLESS STEEL

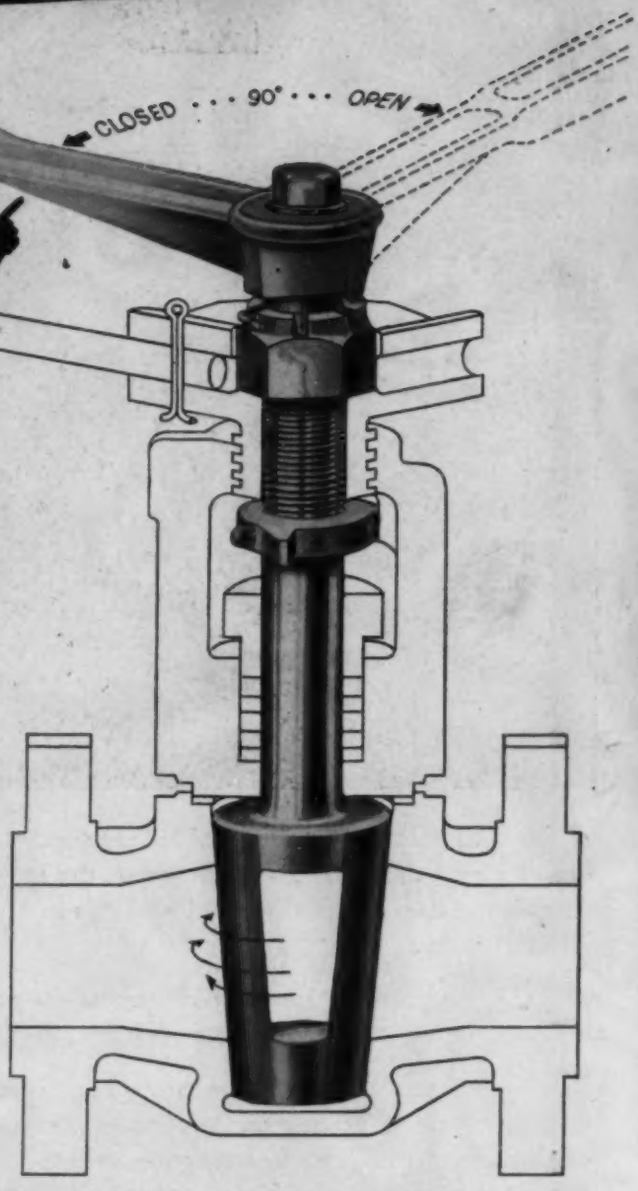
*Reg. U. S. Pat. Off.

Other Republic products include Pipe, Sheets, Upson Quality Bolts and Nuts, Electrunite* Condenser and Heat Exchanger Tubes

Homestead Lever-Seald Valves

Operate 16 to 28 times faster

than Screw-Stem-Type Valves



A QUARTER-TURN FULLY OPENS OR CLOSES

From wide open to completely closed position in an instant is only one of the many features that make the operation of Homestead Lever-Seald Valves fast, sure, positive! An easy, QUARTER-TURN of the upper lever, through a 90 degree arc, *fully* OPENS or CLOSES the valve. As a result, Homestead Lever-Seald Valves OPERATE 16 to 28 TIMES FASTER! And visible outside stops tell you that your Homestead Lever-Seald Valve is *fully* opened or closed.

In addition to faster operation, the QUARTER-TURN principle makes possible installation and operation of Homestead Lever-Seald Valves in restricted areas . . . next to walls, floors, ceilings, congested piping and other obstructions. For fast, speedy, time and labor-saving operation, keep these important points in mind when renewing valves or specifying for new installations.

Homestead Lever-Seald Valves are made in combinations of metals and alloys to meet your service requirements, in sizes 1½" to 10", for pressure ranges from 150 pounds to 1500 pounds. Our Engineers will design valves to your specific requirements. Write NOW for Valve Reference Book No. 38.

Maritime's two-flag, highest production award to our men and women making valves for the Victory Fleet.

HOMESTEAD-VALVE MFG. CO.,
P. O. BOX 22 · CORAOPOLIS, PA.

1. Instant stick-proof operation.
2. QUARTER-TURN FULLY OPENS OR CLOSES.
3. Positive seal without lubrication.
4. Seating surfaces always protected in both open and closed positions. Corrosion practically eliminated.
5. Unobstructed straight-line fluid flow.
6. All operating parts protected from ravages of service conditions and weather.

A difficult portage is lessened with a substantial **GUIDE!**

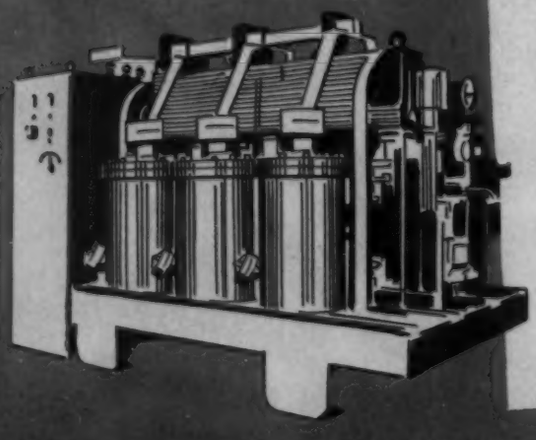
TRANTINYL GUIDES
ARE CAST TO TAKE IT

Youngstown Alloy Casting Corporation

YOUNGSTOWN, OHIO

Sawing hot pipe...

NEWS OF WESTINGHOUSE SERVICES AND PRODUCTS FOR THE STEEL INDUSTRY



NEW FLEXIBILITY IN POWER SUPPLY

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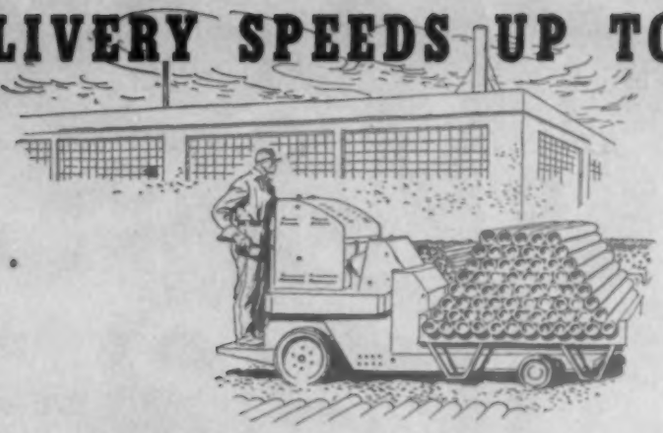

A steel manufacturer recently came to Westinghouse with a knotty problem. Production on his Fretz Moon pipe mills was limited by the speed at which hot pipe could be sawed into accurately measured lengths as it came from the mills.

The type of saw being used started and stopped for each cut. It could not be synchronized with the travel of the pipe. As a result, cuts could not be made to accurate lengths. Maintenance was high, and interruptions in mill operations were excessive.

Westinghouse engineers joined with steel company engineers in a search for the solution. The result was a "Flying Saw", which travels at the same speed as the pipe—cutting it into accurately measured lengths "on the run". It's all done with an ease and smoothness that eliminates maintenance and resulting interruptions in mill operations.

In effect, the saw carriage runs back and forth continuously along the moving pipe. For a brief instant in each round trip it is moving in the same direction as the pipe and at the same speed. In this instant the carriage tilts forward and the high-speed rotary saw slices through the metal. This complex job of timing and co-ordination is handled automatically, by electrical regulation and associated Westinghouse Synchro-tie.

Speed of the mills has been increased—to 500 fpm for half inch pipe, to 300 fpm for one and a half inch pipe. Thus, a production bottleneck has been removed, permitting the mills to turn out greatly increased tonnage of a superior product.

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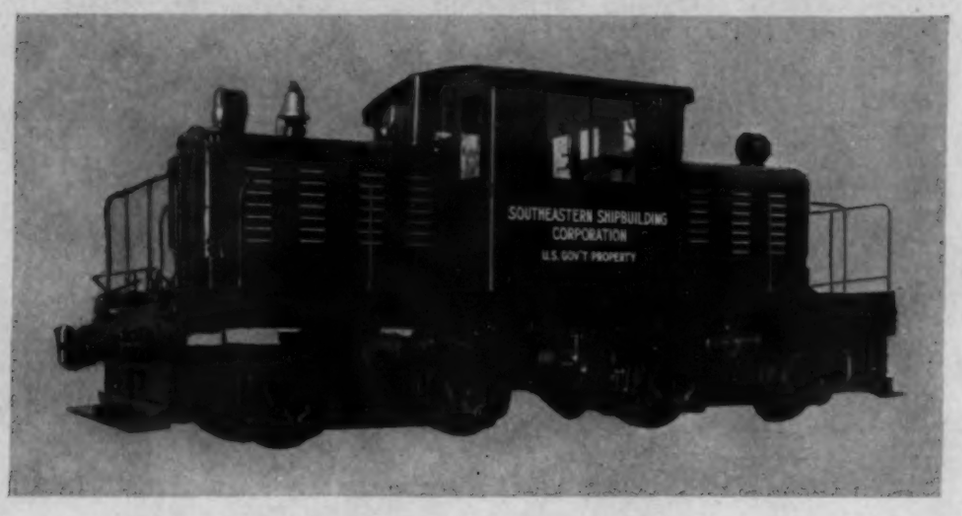

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help large manufacturer in change-over

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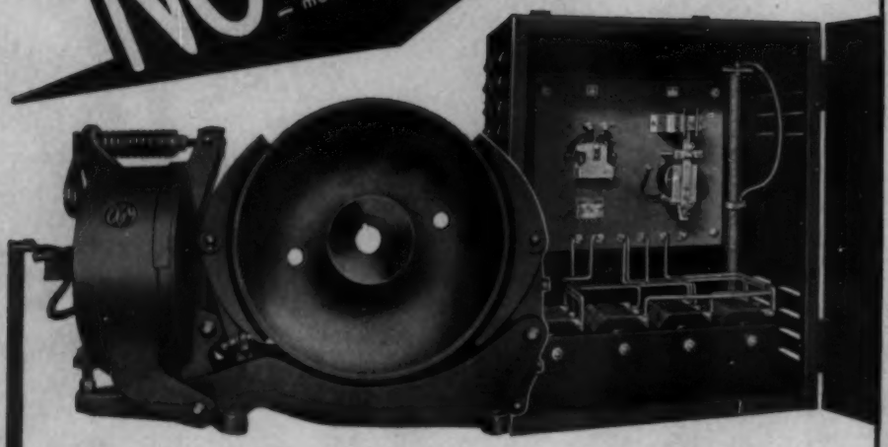

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The well known EC&M WB Brake for d-c service is now available for operation on a-c circuits by the addition of a compact rectifier-unit. When used with magnetic control, the rectifier equipment is usually combined with the motor control panel.

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New Bulletin 1006 gives complete facts on EC&M "WB" Brakes for a-c motors. Write for a copy today.

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Now--BRAKES for A-c & D-c by EC&M

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To hold the trolley stationary when raising or lowering a load by this floor-controlled crane, another EC&M Type WB Brake is applied on the trolley-motor shaft. The trolley controller is of the manually-operated type, and for this application the rectifier is a separately mounted, enclosed unit as shown in the illustration to the left of this column.

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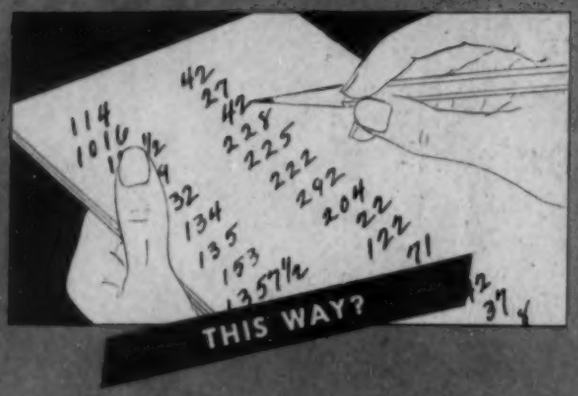

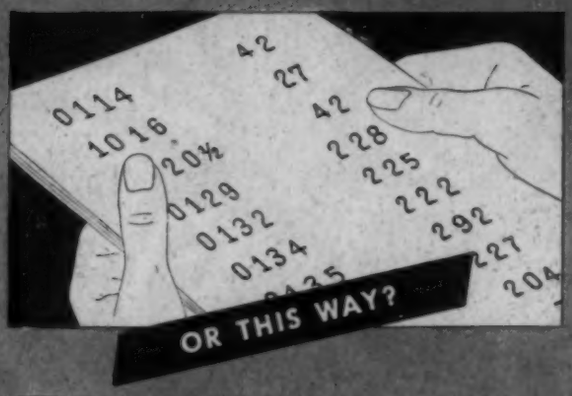

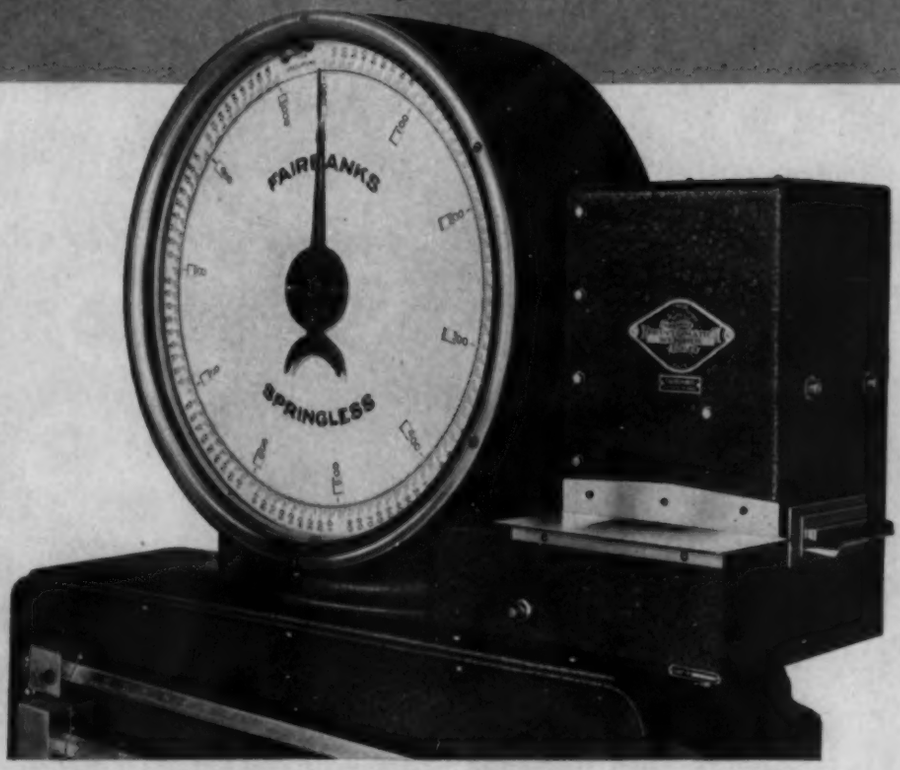

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● Of course, *sustained accuracy* in the weighing machine is vitally important. But no matter how accurate the machine is, unless weights are *accurately recorded,* the element of error still remains.

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Scales

Changing war strategy accents production of depth charges, planes, bombs. *Page 59*

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STEEL

The Magazine of Metalworking and Metalproducing

JUNE 28, 1943

Volume 112 *Number 26*

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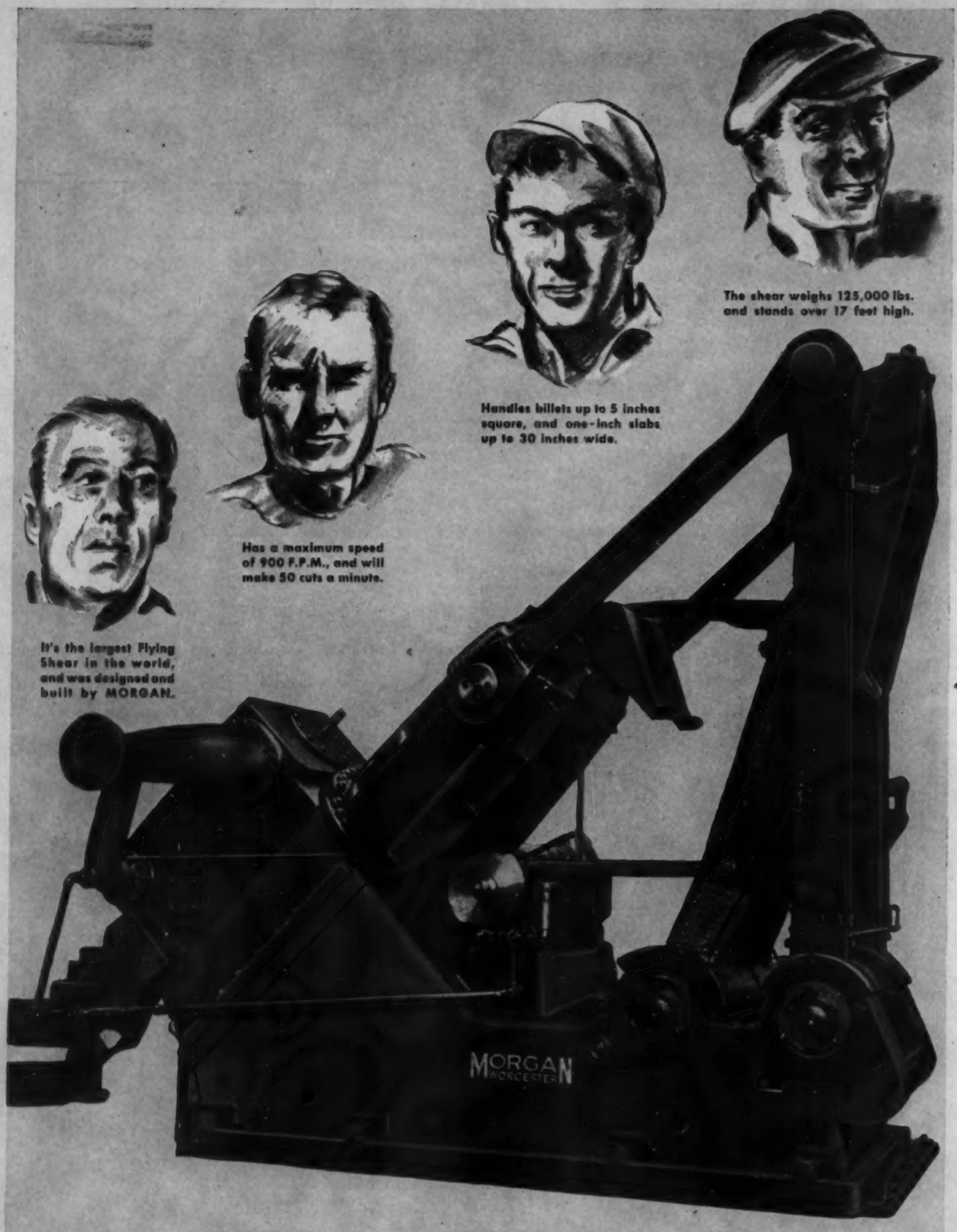
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STEEL
June 28, 1943

POLITICAL EXPEDIENCY: As this is written, the American labor situation, as reflected by the latest developments in the coal strike, is in a deplorable mess. It is true that the miners are slowly drifting back to work, but not enthusiastically. It is true that the demanded wage increases were not forthcoming, but whatever credit is deserved by government authorities on this score is offset by other factors. WLB has been discredited, the operators have been gypped, the public is disgusted and the Allied Nations are puzzled by our apparent inability to handle our internal affairs effectively.

On top of this, the President has issued a "work or draft" feeler (p. 32), which appears to be a petulantly-offered substitute for the Connally-Smith anti-strike bill. The President's suggestion seems to find few supporters anywhere.

More unfortunate than any other aspect of the situation is the unmistakable fact that every segment of the public has lost respect for the government's attitude on labor matters. It is clear to everybody—employes, employers, man-in-the-street and even most government officials—that the only labor policy the administration has is that of political expediency.

Worse yet is the absence of any promise of a more constructive policy as long as the present administration remains in office.

• • •

LIGHT ON RENEGOTIATION: Manufacturers testifying at the hearings on contract renegotiation conducted by the House Committee on Naval Affairs (p. 64) gave the lawmakers something to think about if and when they see fit to amend the Contracts Renegotiation Act.

The most frequently mentioned criticism was that the renegotiators deal with profits before taxes. Most industrialists, we believe, will agree with the contractor who told the committee emphatically that "there is no such thing as a profit before taxes." Discussion of profit before taxes cannot be other than academic. Congress should put renegotiation on the practical basis of profit after taxes.

Another point stressed by many of the witnesses was that the renegotiation act makes absolutely no provision for the contractor's problem of changing from a wartime to a peacetime economy. The allowable profits of 2 or 3 per cent after taxes do not permit a contractor to accumulate a reserve adequate for postwar adjustments.

One witness said that renegotiation is like the old practice of piecework rate cutting. Cutting piecework rates unfairly deadened the incentive to piecework employes. Cutting contract prices by renegotiation similarly dulls the incentive to contractors.

Renegotiation is one of the most important problems confronting industry. The House Naval Affairs Committee deserves commendation for seeking light on the subject.

• • •

A TOUGH ASSIGNMENT: Considerable confusion prevails as to the progress of the war production program. Cutbacks in war orders, particularly in contracts for tanks, have given some persons the idea that the production problem is easing. Against this are frequent bear stories from Washington, including the statement that the output of finished steel in the third quarter will fall a million tons short of essential requirements.

Much of the confusion arises from attempts to generalize from isolated instances. Portions of the war program are being cut back (p. 60), but the over-all situation is that 59 per cent of the job scheduled for 1943 must be done in the second half. Industry must produce more in the next six months than it has produced in the last six months.

Proof that the circumstances do not warrant complacency is found in the steel situation. Steel ingot production for the first half of 1943 will total 44,200,000 tons (p. 49)—a new high for the period. In the war years of 1940 and 1941 about 49.4 per cent of the year's output was produced in the first half and 50.6 per cent in the second half. If this relationship prevails in 1943, production for the last half will be about 45,300,000 tons and the total for the year will be 89,500,000 tons.

This is deplorably short of the fixed goal of 92,-

(OVER)

000,000 tons. Thus the industry faces a real challenge. If new capacity can be put into operation sooner than scheduled, if interruptions from strikes can be curtailed and if greater output can be squeezed out of existing facilities, the goal may be reached or exceeded.

This is a tough assignment. Close co-operation between industry, employes and government agencies will be required to carry it out successfully.

• • •

INGENUITY--TWO KINDS: Two blast furnaces figure in the news this week. On June 18 the Bethlehem Steel Co. blew in a new 1200-ton stack (p. 79) at its Lackawanna plant. Down in Monclova, Coahuila, Mexico, a 350-ton blast furnace (p. 98) is being erected from the usable remains of the abandoned property of the old Mississippi Valley Iron Co. at St. Louis.

The furnaces present a curious contrast in several respects. The Bethlehem furnace reflects the latest improvements in ironmaking equipment. Its design, construction and operation conform to the best orthodox ideas the blast furnace industry has developed.

The Monclova furnace is unorthodox in almost every particular. Its principal parts were salvaged from the old Mississippi Valley property, but also incorporated in it is equipment from other blast furnaces, not to mention cranes, machine tools and structural items gathered from stone quarries and industries far outside the realm of iron and steel.

Despite these contrasts, the two furnaces have two things in common. Both are born out of the urgency of war. Both reflect a high degree of ingenuity and resourcefulness on the part of their builders.

• • •

AGE CREEPS UPON US: Experts in the census department remind us that changes in population will affect the future economic conditions of the country. For instance, sometime this year the margin in the excess of males over females in the United States (p. 76), which was 2,800,000 in 1910, will be wiped out and henceforth there will be an increasing excess of females.

In 1900 only 46 per cent of our population was 25 years of age or older. Today 56.7 per cent of our people are 25 years of age or older. By 1965 the ratio will be nearly 65 per cent.

These changes are bound to affect industry. Their influence will be felt in employment problems and in the character of markets for industry's products.

• • •

PRICE INCONGRUITIES: When the government freezes some prices and wages but leaves others exposed to the old law of supply and demand, it invites trouble. Much of the confusion in the domestic economy of the nation today can be traced to this incongruous price situation.

A case in point is the castings industry. Foundrymen are confronted with a difficult manpower problem (p. 53) which stems chiefly from their inability under emergency laws to raise wage rates to compete with the higher paid jobs offered by other types of war contractors. Another factor is the inability of foundries to use women as extensively as some other manufacturers.

Casting plants also are threatened with a shortage of core binder material. Producers of binders made from cereals have been forced to close down because the incentive of price has caused farmers to feed corn to hogs rather than to sell it to the corn refiners and processors, who are subject to price ceilings which prevent them from bidding for the farmers' product.

Most government agencies need a practical course in the economics of prices.

• • •

29 YEARS AGO TODAY: Just 29 years ago today a young Serbian student in Sarajevo, Bosnia, shot and killed Archduke Francis Ferdinand, heir to the Austrian throne, and his wife, the Duchess of Hohenberg. This incident, seemingly remote and inconsequential to most Americans, precipitated World War I.

In due course, the United States became embroiled in the war. We were in it as active belligerents exactly one year, seven months and five days. We will have been in World War II that long on July 13, 1943. Today we are acutely sensitive to news from every remote corner of the world.

What does this mean in terms of national policy?

E. L. Shaner

EDITOR-IN-CHIEF

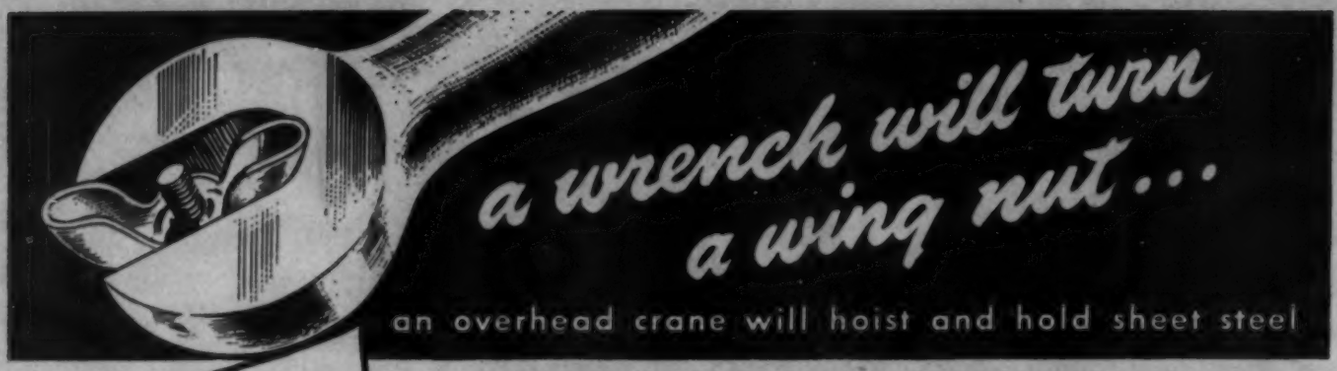
The CREED *of a* GREAT AMERICAN

I was born an American; I will live an American; I shall die an American; and I intend to perform the duties incumbent upon me in that character to the end of my career. I mean to do this, with absolute disregard of personal consequences. What are personal consequences? What is the individual man, with all the good or evil that may betide him, in comparison with the good or evil which may befall a great country in a crisis like this, and in the midst of great transactions which concern that country's fate? Let the consequences be what they will, I am careless. No man can suffer too much, and no man can fall too soon, if he suffer or if he fall in defense of the liberties and Constitution of his country.

Dan'l Webster

We reproduce this creed of a great American in recognition of our employees, who are producing steel on Independence Day as on every other day of this war year. Like thousands of other workmen throughout the country, Inland steelmakers are patriotically performing the duties incumbent upon them as Americans—turning out steel to protect the freedom proclaimed 167 years ago.

Inland Steel Co.



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True Efficiency with Greater Economy on Point-of-Operation Handling Calls for JIB CRANES

★ Above photo shows how a large steel plant's overhead crane has just handed a piece of sheet steel to a nimble Jib Crane for the shearing operation.

Note how the overhead crane has scarcely started on its return trip, yet the Jib Crane has already placed the work in position on the shears for swiftly progressive cutting operations. Meantime, the overhead crane is completely released for heavier hoisting and handling thereby eliminating a costly tie-up on a job made-to-order for the Jib Crane.

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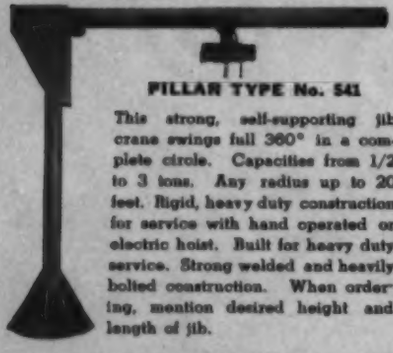

PILLAR TYPE No. 541

This strong, self-supporting jib crane swings full 360° in a complete circle. Capacities from 1/2 to 3 tons. Any radius up to 20 feet. Rigid, heavy duty construction for service with hand operated or electric hoist. Built for heavy duty service. Strong welded and heavily bolted construction. When ordering, mention desired height and length of jib.

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SWINGING BRACKET No. 539

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Attainment of 1943 Production Goal CHALLENGES NATION'S STEELMAKERS

By W. J. Campbell
Associate Editor, STEEL

Expansion program to be largely completed by year's end. Postwar market for consumers' durable goods promising. Corporations hampered by conversion costs, renegotiation of contracts and high taxes

RESPONDING to the challenge by war agencies to increase steel production above present record output, representatives of 90 per cent of the industry meeting last week at the offices of the American Iron and Steel Institute, New York, started to explore possible ways and means of obtaining greater tonnages.

They pledged that "wherever possible, steps will be taken to speed up output in every phase of operations."

Specifically, a million tons more in each of the third and fourth quarters from existing facilities has been asked by planners of the war program. Commonly mentioned goal for the entire year is 92,000,000 tons.

First six months' output has been about 44,200,000 tons, a new record for the period. However, to reach the year's goal would require production of 47,800,000 tons in the last half, or 3,600,000 tons more than was made in the six months just ending.

In every year since the war started, second half production has exceeded that of the first half, due to steadily increasing demand and to expanding capacity. Since 1939, first half and annual production figures have been:

	6 mos.	12 mos.
1939	18,629,927	51,584,986
1940	29,405,402	66,981,662
1941	40,911,886	82,836,946
1942	42,535,923	86,029,921
1943	44,200,000	?

Experience in 1941 and 1942, when the war production program was proceeding under forced draft, should be reasonably comparable to the current year. In the second halves of both these years, output was approximately a million tons greater than in the first halves.

The same factors that have contributed to the steadily expanding output of the past will be present in the second half this year: (1) Demand will be greater than supply; (2) additional capacity will be brought into operation as the steel expansion program nears completion.

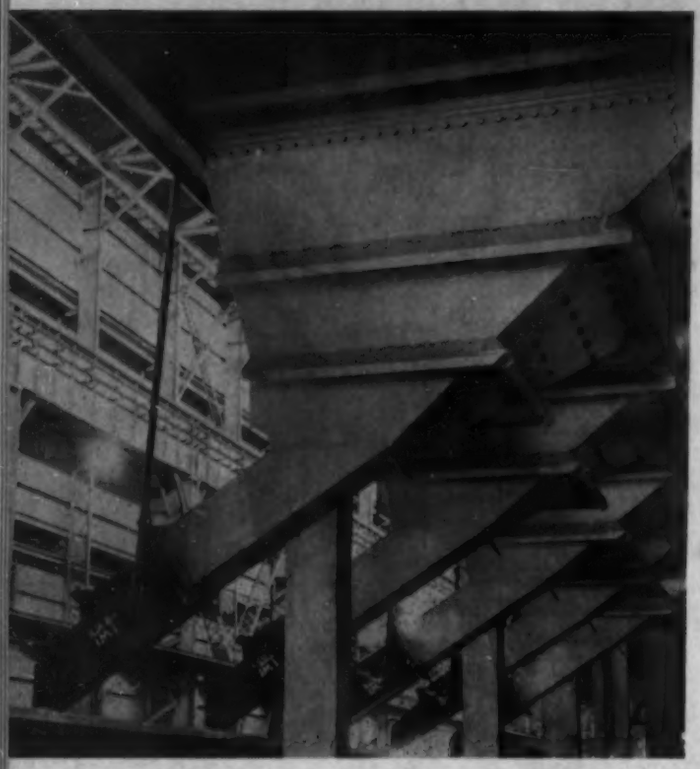
However, these are likely to be offset by adverse factors, which many steel production authorities believe, may make attainment of the goal difficult.

Unfavorable factors are:

(1). Coke and coal shortage. Already many thousands of tons of steel have been lost by coal mine shutdowns. Fuel stocks have been depleted, and restocking will be extremely difficult due to already over-burdened transportation facilities.

(2). Necessity for repairs to blast furnaces and open hearths. For the past three years, facilities have been operated at or near practical capacity and in recent months, steelmakers have found increasingly difficult the keeping of these furnaces in operation. This situation will become more aggravated during the second half.

(3). Strikes. Flash or wildcat stoppages have been numerous and have



Kitchen behind new open hearth department, left, at Carnegie - Illinois' new Homestead, Pa., expansion where steelmaking ingredients are moved into position for charging into the furnaces through a series of bins, chutes and conveyors. At bottom of page, the 11 new open hearths at the Homestead project which will add 1,500,000 tons to this country's steelmaking capacity

caused greater loss in production than indicated by the man-hours lost. At present, there is no indication that this situation will improve during the second half.

(4). Increased absenteeism due to longer workweeks. Imposition of the mandatory 48-hour week throughout the industry is expected to be accompanied by greater unwarranted absences, especially in the more difficult jobs. With no reserve workers permitted, it will be more than ordinarily difficult to fill the gaps caused by absentees.

(5). Tight raw materials situation. Scrap, although in fairly comfortable supply at present, may become scarce in the fourth quarter. Deficiencies in iron ores of certain analyses may result from lowered stocks due to late opening of the lake shipping season and unfavorable weather later. This is unlikely to affect production during the current calendar year, but may be felt next spring.

How the unfavorable factors will balance the additional capacity to be brought in during the second half is anyone's guess.

Among the major projects to be completed this year are:

The Homestead, Pa., expansion of Carnegie-Illinois Steel Corp. which will add about 1,500,000 tons capacity. Steel was poured from the first of 11 open hearths the middle of June and the entire plant is expected to be completed by year's end.

Geneva, Utah, works of Columbia Steel Co., with 1,300,000 tons of open hearth capacity is scheduled to be completed by year's end. However, it is unlikely that any considerable amount of steel will be produced in this calendar year.

Republic Steel Corp.'s new electric furnace plant at South Chicago, Ill., comprising nine 70-ton furnaces, already partially in production, will add materially to electric steel output in the second half.

Henry J. Kaiser's Fontana, Calif., plant, rated at 675,000 tons of open hearth capacity with six 185-ton furnaces, also will affect second half figures.

Numerous smaller expansions are in varying stages of completion and some will be operating at virtual capacity for the third and fourth quarters.

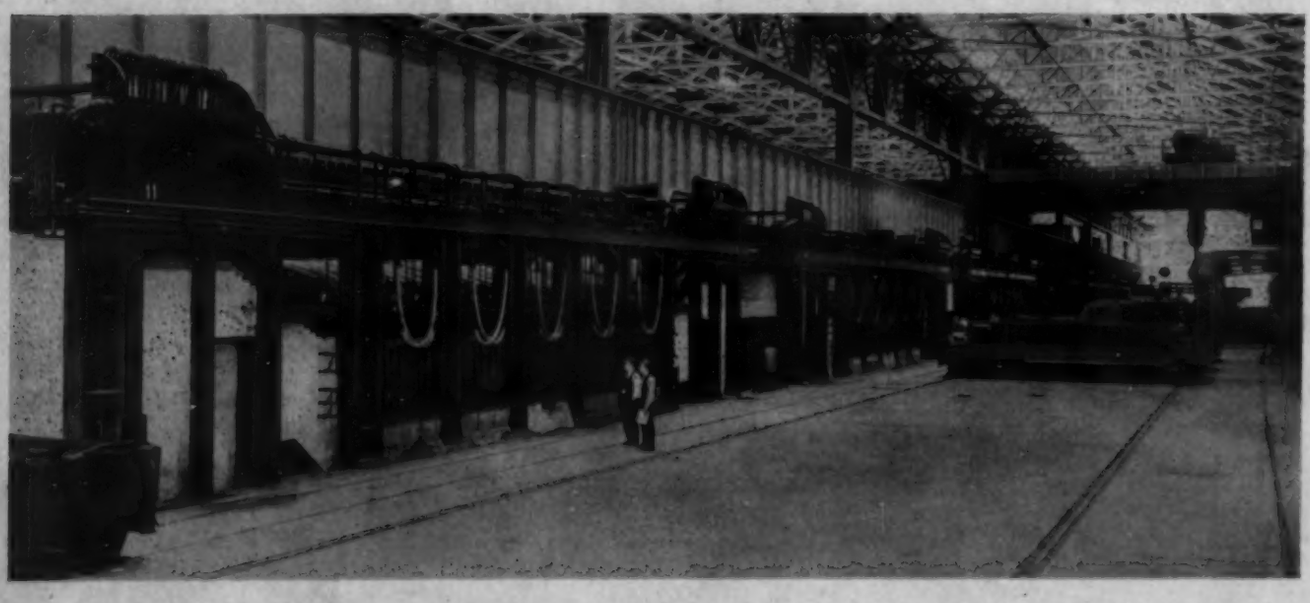
While many of the expansion programs have been delayed for several months or longer, it is now expected that the bulk of the program will be completed by the end of the year, with a few projects running over until February of 1944.

Capacity for steel ingots and steel for castings as of Jan. 1 was 90,292,660. When the present expansion program is completed early next year, capacity will be raised to more than 97,000,000 tons.

Progress of the expansion program:

Jan. 1, 1941	84,152,292
July 1, 1941	86,148,700
Jan. 1, 1942	88,569,970
July 1, 1942	89,198,320
Jan. 1, 1943	90,292,660
Jan. 1, 1944	97,000,000

Blast furnace capacity has been increased from 57,609,590 tons as of Jan.



1, 1941, to 63,933,530 on Jan. 1, 1943, and will be increased by about 7,000,000 tons during the current year. Many of the new stacks already have been blown in.

Meanwhile, war production agencies are asking producers to make 1,000,000 tons more steel from existing facilities for the third and the fourth quarters. It has been suggested that some of the capacity formerly devoted to the production of alloy steels be shifted back to carbon steel, following the cutback of tank production for Russia. Carbon heats can be turned out in less time than alloy heats and crop loss is less. Closer control over distribution of excess inventories and rushing of some pending projects to completion also have been advanced as a means to increasing production during the second half. Steelmakers doubt that output of present facilities can be pushed up much under present conditions.

Despite shifting requirements for steel due to changes in military strategy, overall demand continues to exceed supply. No early diversion to peacetime projects is probable. As a matter of fact, stated requirements of the military agencies have been cut back substantially, while essential civilian industries are in dire need of greater supplies.

Allotments to the Army for third quarter for carbon steel have been cut back to 86 per cent of the carbon steel asked; alloy requirements of the Army have been cut a sixth.

The Navy will get only 80 per cent of the carbon steel requested and alloy needs have been cut 16 per cent.

The Maritime Commission will be allowed only 78 per cent of the steel it wants.

Railroads are to obtain only 60 per cent of the steel they requested, while other essential industries, such as the farm equipment, motor freight, and others are getting much less than they actually require. Repair parts for a wide variety of civilian but essential equipment will be unavailable due to the steel scarcity.

Many are the guesses as to the effect of a vastly expanded iron and steel capacity in the postwar era. Certain is an accumulated demand for durable consumer goods, home construction, reconstruction of war devastated areas, rehabilitation of railroads and farm implements.

Individuals will have greatly increased purchasing power when the war ends. Their demands have been and will be deferred for the duration. These accumulated deferred demands are backed up by individual savings, through war bonds and other sources. Individuals' assets are liquid and likely will be largely expended when consumer goods again become available.

Corporate spending likely will be hampered by high conversion costs and high war taxes, which have left companies little opportunity to build up sufficient reserves to meet their reconstruction needs in the post war period.

Present, Past and Pending

■ ACTION STILL PENDS ON STOCKPILING

NEW YORK—Formal action still is pending by the American Institute of Mining and Metallurgical Engineers on a proposed resolution concerning the setting up of reserves of critical metals and minerals after the war.

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■ ORDERS FOR NEW TYPE SHELL EXPECTED

PHILADELPHIA—Orders for a new type of armor-piercing 20-millimeter shell are expected to be released shortly. On some types of shell work certain cold-drawn steel bar producers have recently received orders calling for delivery over the next 12 months.

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■ DOMESTIC LEAD OUTPUT DECLINE FACED

WASHINGTON—Because of manpower shortages and other factors, the nation faces a decline in domestic lead production, the War Production Board warns. Optimism of the recent past with respect to lead supply has been replaced by a feeling of concern over the outlook.

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■ ORE CONCENTRATOR DAMAGED BY FIRE

DOVER, N. J.—Ore concentrator at the Mt. Hope mine of the Warren Foundry & Pipe Co. near here was damaged to the extent of $200,000 by fire.

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■ OUTPUT OF PLANES SOARS DURING MAY

WASHINGTON—Output of combat and trainer aircraft during May reached the unprecedented total of almost 7200 planes, with total airframe weight of approximately sixty million pounds, the War Production Board reports.

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■ NEW PRICE SCHEDULE FOR USED MACHINE TOOLS

WASHINGTON—OPA has published new regulations and a price manual on used machine tools, to be issued July 20 and is effective July 26.

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■ STEEL PRODUCTS WAREHOUSE ASSOCIATION HEAD QUITS

CLEVELAND—C. M. Ballou has resigned the presidency of the Steel Products Warehouse Association Inc., this city. He has been president since the association's inception Dec. 15, 1942. The group consists of 44 warehouses specializing in flat rolled steel products, both prime and seconds.

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■ EXPORTERS STUDY STEELMAKING PROCESSES

BIRMINGHAM, ALA.—A group of export representatives of the United States Steel Export Co. is undertaking a five months' study course in steelmaking and processing. The program is dedicated to the international concept of the nation's industrial ingenuity, productive capacities, and products, so that new avenues of world trade may be reached by American interests.

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■ LARGE SURPLUS STOCKS OF METAL FOUND

DETROIT—From Oct. 1, 1942 to May 1, 1943, inventories of copper, steel and aluminum, reported by Michigan industry as surplus available to others, amounted to 131,839,521 pounds.

Prominent Ore Importer Dies After Short Illness

Paul G. Leoni, 56, prominent ore importer and president and director of the Iron & Ore Corp. of America and of its parent organization, William H. Muller & Co. Inc., New York, died June 23 at his home in that city after a brief illness.

FDR Holds Draft Club Over Strikers

Limited military service for men up to 65 proposed after third walkout in soft coal mines . . . War Labor Board denies appeal for upward wage adjustment, orders new two-year contract signed

NONCOMBAT military service for war plant strikers up to the age of 65 was proposed last week by President Roosevelt in a sharply-worded condemnation of the third strike in two months in the country's coal mines.

The Chief Executive warned that he would ask Congress to raise the draft age limit to 65 "so that if at any time in the future there should be a threat of interruption of work in plants, mines, or establishments owned by the government or taken possession of by the government, the machinery will be available for prompt action."

This proposal gave rise to considerable speculation as to the extent to which it would be applied. Some observers asked: If the railroad workers should vote to strike as result of rejection of their wage increase demands by Economic Stabilizer Vinson last week, would the government seize the railroads and subject the 38 to 65-year-old railroad workers to the draft? Who then would man the carriers? And who would mine the coal?

UMW President John L. Lewis directed the miners to resume production of coal until Oct. 31, provided the mines remain under the direction of Secretary of the Interior Harold Ickes. Lewis threatened the resumption of work would be automatically terminated if the mines were returned to the private owners lacking settlement of the present contract controversy.

Operations Resumed Slowly

Resumption of operations proceeded slowly despite Lewis' order and a shortage of coking coal developed in the Pittsburgh area.

Mr. Ickes, noting the dwindling stockpiles of fuel above ground, indicated coal rationing might become necessary, especially in certain areas like the Northwest.

Earlier the War Labor Board had denied the miners' request for an upward adjustment in wages based on travel time from portal to working face, and directed operators and miners to write a new contract for a two-year period ending April 1, 1945, incorporating a no-strike clause.

Mine owners held that nothing has been settled by Lewis' back to work order and asked the War Labor Board to enforce its order for a new contract and to restore the mines to their rightful owners.

To do otherwise, they declared, would be to punish the operators and to reward Lewis for defying the government.

Unauthorized Stoppages Slow Output at Gary

Carnegie-Illinois Steel Corp. units in Chicago continue to have production curtailed by unauthorized work stoppages of small groups of the United Steelworkers of America (CIO). Most recently involved were the Gary rail mill—largest in the world—at Gary steel works and the electrolytic tinning department at Gary sheet and tinworks.

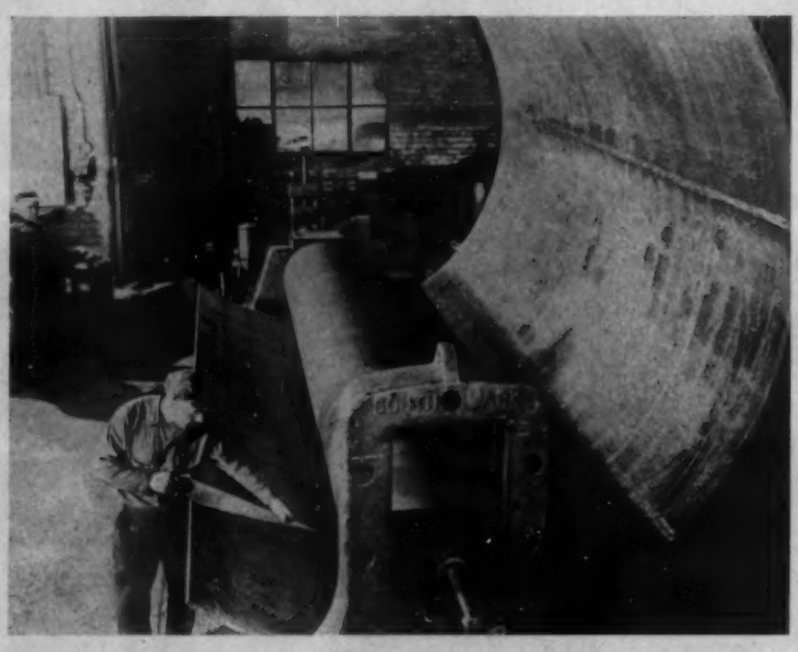
Interruption at the rail mill started June 12 when five butt pullers and six rail turners on the afternoon shift slowed down and subsequently quit work to protest delay in negotiations for a wage increase. The same men on succeeding shifts also refused to work, thus necessitating closing down the mill and throwing over 200 out of their work. Operations resumed 24 hours later.

The situation was repeated on the afternoon of June 17. The mill was reopened on the morning of the following day, when the company began rolling billets instead of rail, operations which did not require butt pullers and rail turners. Company discontinued this work, however, during the early morning of June 19. The 11 men refusing to return at this time, the mill remained idle until the afternoon of June 20, when it again resumed normally. Production lost amounted to about 1000 tons a day.

In the meantime, 17 workers on one shift at two electrolytic tin lines at the Gary sheet and tin works quit on the afternoon of June 21, complaining that they could not keep up with the pressure of work. They returned June 23.

Plan Set Up for Putting 48-Hour Week Into Effect

War Manpower Commission director for the Pittsburgh area, Patrick T. Fagan, announced last week that the area management-labor committee for the WMC has completed plans and set up a three point program whereby the minimum wartime work-week of 48 hours may be established in the iron and steel industry as expeditiously as possible and that the local industry may be operating on that basis not later than Aug. 1.



BIG PLATES FROM LITTLE ONES: Unable to obtain single plates to specification for large motor-generator and turbine wrapper sheets, General Electric Co. welds smaller pieces together for the purpose at its Schenectady works. Above plate being bent to proper curvature consists of four sections joined by three arc welded seams

Foundry Operations Hampered

Loss of labor to armed forces and to higher paying war jobs creating serious industry problem. . . Employment of women gains but job turnover is high among unskilled workers

MANPOWER shortage in the foundry industry is becoming increasingly acute —preventing capacity operations in many instances.

This is particularly true among the steel foundries and to a lesser extent among the nonferrous, malleable and gray iron shops in the order named. Loss of men to the armed services and to higher paying jobs, requiring less manual work, have combined to create a serious manpower shortage in the industry.

Normally foundry interests have attempted to fill their labor needs from the areas in which they operated, but in the past year they have been forced to obtain men from other localities, notably the south. However, the southern states are said to be no longer of much assistance, for the manpower in that area has been largely drained.

Because of the character of operations most foundries have not been able to adapt themselves to employment of women as easily as other industries. However, in some foundries women represent as much as 30 per cent of the total number of employes and employment of women is increasing in most foundries.

Women are serving in the industry as inspectors, laboratory helpers, sand mill operators, core workers, acetylene cutters, welders, electric and gasoline industrial truck operators, oilers, crane operators and oven tenders.

Job turnover in foundries is very high, notably among unskilled employes. To prevent the constant loss of men to machine shops and other plants on war work, industry officials have been doing everything possible to make foundry work more attractive, safe and healthful.

Seriousness of the foundry manpower shortage is best illustrated by the fact that despite sufficient plant capacity many interests are behind in meeting war production schedules. All four foundry groups could substantially increase output if the manpower were available, and absenteeism reduced. Deliveries, while varying widely, appear to average two to three months.

Increased production of castings since the outbreak of the war has largely been achieved through fuller use of existing facilities and improved material handling systems. Steel foundries were the only foundry group to find it necessary to sharply increase operating facilities to meet the unprecedented war demand.

An indication of the sharp upturn in the production of steel castings is illustrated by the following figures, which include an estimate of the tonnage produced by "captive" foundries. On this basis output in 1933 is estimated at 390,000 tons; 1939 at 830,000; 1941 at 1,800,000; while WPB estimated 1942 output at 2,339,000 and set a goal of 3,154,000 for this year.

Current output of steel foundries is only at about 85 per cent of capacity, due primarily to manpower shortage. Officials state one of the biggest problems the industry faces is that of manning new plants.

Employment trend in the steel foundry group has risen steadily, along with increased output and expanded capacity. For the commercial steel foundries employment was estimated at 25,500 in 1934; 30,000 for 1939 and rose further to 35,000 by close of 1940. Currently employment for this group is placed at near 100,000, against 70,000 a year ago. If the employes of the "captive" steel foundries now engaged in war production are included, an additional increase of an estimated 40 per cent for the war years should be made.

Malleable foundry industry is said to be operating at about 90 per cent of capacity, off slightly from the close of last year. Labor isn't available to bring output up to 100 per cent, officials state.

Production capacity for malleable iron castings is estimated at 1,200,000 tons annually, generally unchanged from prior to the war. Output totaled 947,000 tons in 1929; 632,000 in 1940 and 972,000 tons in 1941. Production in 1942 was off 5 per cent to 930,000 tons.

At present order backlogs average three months for malleable iron castings, with orders increasing and production barely holding its own. Employment is currently about 38,000, compared with a peak in recent years of 43,000 in 1929 and a low of 22,000 in 1932.

Castings Production Threatened By Shortage of Cereal Binders

DWINDLING supply of cereal binders threatens to curtail foundry operations soon.

Approximately 40,000,000 bushels of corn are ground annually to produce 150,000,000 pounds of binders for use in preparation of cores and facing sands.

Unfavorable weather, huge demand from war industries, lend-lease shipments, and a low corn price ceiling, in relation to hog prices, have brought about a serious corn shortage. Corn refiners and processors already have been forced to curtail operations, and a complete shutdown within the next few weeks is likely unless the situation is remedied.

Closing down of the processing plants also will cripple production of explosives, ferrous and nonferrous castings, and other war products.

Apparent substitutes for cereal binders that could be used in foundries include: the by-product of the sulphite paper process known as lignin, in liquid or powdered form; dextrine; synthetic resins; soybean meal and rosin base binders. To what extent these substitutes will be able to meet the enormous new demand has not yet been determined.

Foundries normally carry from two to three weeks' supply of cereal binders in stock.

At a recent meeting with mid-western senators, J. B. Huston, director, Commodity Credit Corp., outlined the government plan to break the price jam that is said to have virtually "frozen" corn trading. He said 25,000,000 bushels of privately owned corn in grain elevators will be seized for plants manufacturing corn by-products for war use unless crops can be moved "off the farms."

The program includes:

(1). Terminating government loans on 47,000,000 bushels of the 1942 crops, requiring farmers to pay up by July 15 or surrender the corn to the government.

(2). The Commodity Credit Corp. will supply those refiners and processors who have been forced to close down or are running short of supplies.

(3). Requisitioning of privately owned corn in these plants if the CCC is unable to supply sufficient corn.

Mr. Huston said the CCC now holds 10,000,000 bushels of corn for transfer to industrial users, and estimated the stocks in storage elevators, which might be seized, at 25,000,000. About 950,000,000 bushels are being held on the farms.

See Army Goods Output Decline

WPB says overall war output in May up despite drop in material for ground forces

EXPRESSING concern over the fact Army goods production fell below schedule in May, Under-Secretary for War Patterson, at a press conference June 19, attributed part of the decline to "complacency and over-confidence."

He said data for the first ten days of June indicated no marked improvement over the May showing.

May production of material for the ground forces, Patterson said, was scheduled to rise 2 per cent from $1,553,000,000 in April to $1,582,000,000. Actually, however, it declined 3½ per cent to $1,494,000,000. Only in the field of aircraft production was the picture encouraging, said the under-secretary.

Mr. Patterson attributed the letdown to overconfidence inspired by the Tunisian victory, the success of European bombing, rumors of vast quantities of Army supplies being stored up in America far beyond our abilities to transport overseas, and to the mistaken belief on the part of many that materiel in great quantities will shortly become available for re-conversion of many war facilities to production of less essential civilian items.

A spokesman for WPB, commenting on Mr. Patterson's statement, noted that the drop in May production mentioned by Mr. Patterson referred only to output for the Army ground forces. In this connection he emphasized that the largest cutbacks were in this program and he directed attention to the fact that the ground forces program constituted only 1/6 of the overall war program.

The WPB spokesman said production as a whole for May including that for the Army ground forces, is tentatively estimated to have been 2 per cent greater than that for April. He said production as a whole had not fallen although in some cases May schedules had been lower than those of April.

Goodyear Dedicates New Research Laboratory

Goodyear Tire & Rubber Co.'s new research laboratory, dedicated in Akron, O., last week, provides scientists and engineers of the research division with modern equipment for scientific investigation.

Built and equipped at a cost of $1,325,000, the new laboratory contains the latest and most powerful instruments available for research in rubber, synthetic rubber, plastics, aircraft, and allied fields.

Industry Needs Marketing Aid

Industrial advertising group asked to help management plan postwar activities

ELMER L. LINDSETH, vice president, Cleveland Electric Illuminating Co., and Cleveland chairman, Committee for Economic Development, called upon members of the National Industrial Advertisers Association at their regional conference in Cleveland June 25 to aid management in planning its means of distribution, analyzing its markets and creating its promotional programs for the postwar period.

He said business and industry face the problem of increasing annual gross output of goods and services over one-third above 1940 level and to raise it in the fields of manufacturer and consumer durable goods by two-thirds.

If the government dominates postwar economy, he said, it means a vast public works program, government partnership and retention of economic controls, socialization, and government underwriting.

John May, vice president and general manager, the American Steel & Wire Co., Cleveland, speaking on "Industrial Management's Viewpoint in Postwar Planning" said every individual department of business must be part of the planning.

Other speakers on the program included Herbert V. Mercready, manager, sales promotion, Magnus Chemical Co., Garwood, N. J.; William F. Todd, chief, Field Service Section, War Production Drive Headquarters, Washington; and Lieut. Col. Keith L. Morgan, Bureau of Public Relations, War Department, Washington. Wilmer H. Cordes, advertising manager, American Steel & Wire Co. and president, Industrial Marketers of Cleveland, was conference host.

U. S. Steel Supply Takes Over Milwaukee Warehouse

E. E. Aldous, president, United States Steel Supply Co., United States Steel Corp., subsidiary, announced last week purchase of the physical assets of Moise Steel Co., Milwaukee.

The Supply company will continue the warehouse business conducted by Moise Steel Co. Carl Gallauer, formerly vice president of Moise company has been appointed district manager and J. R. Beers, formerly manager of the Milwaukee sales office, United States Steel Supply Co. has been appointed assistant district manager.

Total Scrap Stocks Up Slightly in April

STEEL and iron scrap stocks held at consumers', suppliers' and producers' plants at the end of April approximated 6,918,000 gross tons, an increase of 1 per cent over the 6,850,000 tons at the end of March, the Bureau of Mines reports.

This increase was occasioned by a gain of 1 per cent in stocks held by consumers, with suppliers' and producers' stocks gaining slightly. Consumers' stocks April 30 were 5,583,000 tons, compared with 5,517,000 at the end of March, and suppliers' and producers' stocks were 1,335,000 and 1,333,000 tons, respectively. Most of the increase in total stocks was contributed by a gain of 2 per cent in purchased stocks at consumers' plants while stocks of home scrap declined less than 1 per cent.

Consumption of scrap in April totaled 4,642,000 tons, a decline of 3 per cent from 4,787,000 tons used in March, but at an annual rate 3 per cent higher than that of 1941.

There were minor changes in proportions of total scrap and pig iron charged to various types of furnaces in April, compared with the calendar year 1941. Open hearth furnaces, which in 1941 used proportions of 19.3 per cent purchased scrap, 29.1 per cent home scrap and 51.6 per cent pig iron, in April showed proportions of 17, 29.7 and 53.3 per cent, respectively, indicating an increased use of pig iron and home scrap.

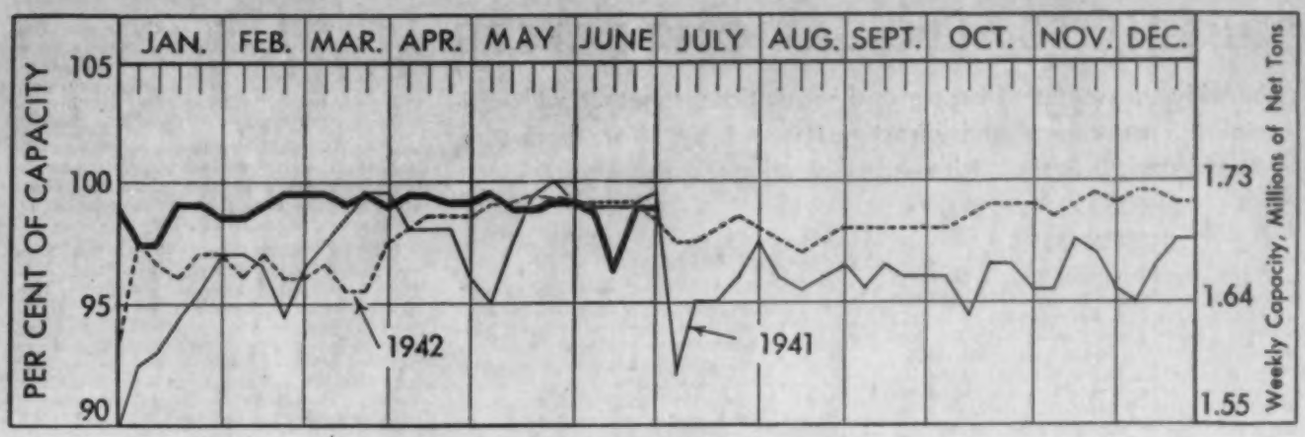
Stocks at end of Month

(000 omitted)

	Scrap		
	Purchased	Home	Pig iron
Apr., 1943	5,416	1,502	1,327
Mar., 1943	5,343	1,507	1,350
Feb., 1943	5,354	1,517	1,370
Jan., 1943	5,401	1,476	1,302
Dec., 1942	5,501	1,429	1,272
Nov., 1942	5,363	1,379	1,191
Oct., 1942	4,956	1,304	1,130

Consumption during Month

	Scrap		
	Purchased	Home	Pig iron
Apr., 1943	2,019	2,623	4,423
Mar., 1943	2,102	2,685	4,660
Feb., 1943	1,857	2,321	4,162
Jan., 1943	1,942	2,550	4,515
Dec., 1942	2,016	2,481	4,465
Nov., 1942	1,905	2,496	4,360
Oct., 1942	2,061	2,709	4,594



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,826	7,670	7,374	7,545	....	....	....	....	....	....	....
1942	7,112	6,512	7,392	7,122	7,382	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150
PIG IRON PRODUCTION												
1943	5,194	4,766	5,314	5,035	5,178	....	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,089	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,531	4,766	4,784	4,721	4,860	4,767	5,014

Auto Plant Output

Continues to rise in May, increasing by $15,000,000 over previous month

WAR production in the automotive industry continued to rise in May, increasing by $15,000,000 over the previous month, George Romney, managing director, Automotive Council for War Production, reported last week.

Latest available figures show that May deliveries by the industry of planes, tanks, military vehicles, guns other war material totaled $685,000,000 compared with April deliveries of $670,000,000. May output was equal to an annual rate of $8,220,000,000.

Employment likewise increased to a new all-time peak in the industry. Currently there are 1,221,000 salaried and hourly-rated workers employed in 825 motor vehicle, body and parts plants. More than 85 per cent of the total are listed as hourly-rated employes, and more than 26 per cent are women workers.

Follansbee Steel Installs New Mill Equipment

Recognizing the necessity of carrying production of alloy steels further by the forging process, the Follansbee Steel Corp., Pittsburgh, is installing a 14-inch roughing and a 12-inch finishing merchant mill for the rolling of alloy and tool steel rounds, squares, hexagons, octagons, and flats in sizes from ¾-inch to 3½ inches.

Four by four billets have been the minimum size produced at this plant in the past. The production of alloy steels at the Follansbee Toronto, O., plant is unusual in equipment and the methods of processing.

The company's small basic open hearth furnaces contribute largely to uniform chemical analyses. In the further processing of the steel, the entire production of the plant's ingot capacity is reduced by forging in place of rolling, as is the usual practice.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended June 26	Change	Ended Week 1942	Ended Week 1941
Pittsburgh	98	+0.5	95.5	100
Chicago	98	+1	103	102.5
Eastern Pa.	93	—1	96	97
Youngstown	97	None	95	98
Wheeling	86.5	—3.5	79.5	84
Cleveland	95	+0.5	94	98
Buffalo	90.5	None	93	90.5
Birmingham	100	None	95	95
New England	95	None	100	100
Cincinnati	95	+2	89	91
St. Louis	95	None	95.5	98
Detroit	92	+5	92	96
Average	98.5	None	*98.5	*99.5

* Computed on bases of steelmaking capacity as of those dates.

Ingot Rate 98½%

Coal interruption had no effect on steel output. Several districts make increases

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was unchanged at 98½ per cent. Five districts registered gains, two declined and five were unchanged from last week's levels.

A year ago the rate was 98½ per cent; two years ago it was 99½ per cent, both based on capacities as of those dates.

The new government-built blast furnace "C" at Lackawanna works of Bethlehem Steel Co. was blown in Friday and an old unit was blown out for rebuilding. Capacity will be increased from 500 to 1200 tons.

While five blast furnaces were idle part of last week in the Pittsburgh district because of coke shortage steel operations were not affected, the rate rising one-half per cent to 98 per cent.

A second stack in the Birmingham area is slated for removal within a few days for repairs.

MAY PIG IRON OUTPUT EXCEEDS APRIL

District	Pig iron	Ferro, spiegel	Total May	Total Year to date	Per cent capacity
Eastern	934,176	24,687	958,863	4,763,631	87.7
Pittsburgh-Youngstown	2,150,137	13,456	2,163,593	10,638,198	99.0
Cleveland-Detroit	543,628	....	543,628	2,559,771	104.5
Chicago	1,087,583	....	1,087,583	5,381,126	97.9
Southern	344,969	13,939	358,908	1,791,884	95.5
Western	63,210	1,943	65,153	373,425	67.6
Total	5,123,703	54,025	5,177,728	25,508,035	96.2

PRIORITIES-ALLOCATIONS-PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

INSTRUCTIONS

STEEL ORDERS: Producers are reminded by H. G. Batcheller, director, Steel Division, that CMP regulations state that an authorized controlled material order under the CMP does not include "any contract, purchase order, or other arrangement which although specifying the total amount to be delivered, contemplates that further instructions are to be given." They are reminded also that any producer who has accepted orders that he does not expect to ship in the month requested must immediately notify his customer and must take steps to correct the status of such orders.

WPB-617: Form PD-200, used to make application for authority to begin construction and for priority assistance, is replaced by form WPB-617. In addition to functions performed by the old PD-200 form, the new one constitutes an application for allotment of controlled materials. Under CMP, any person who made application on form PD-200 and whose application was approved, was required to file additional forms for controlled materials. When WPB-617 comes into use July 1, the filing of these additional forms will no longer be necessary, since controlled materials will be allotted simultaneously with the granting of authority to begin construction. The authorization form will be CMPL-224, which combines the functions of the P-19 series or orders and forms CMP-4C.

CMP REGULATIONS

STEEL BARS: Ban on deliveries of normalized or heat-treated bars to warehouses will remain in effect only until Oct. 1. Warehouses may place orders immediately for delivery after Sept. 30. (CMP Reg. No. 1)

MINIMUM PRODUCTION SCHEDULES: Manufacturers are entitled to apply for (and customers to make) allotments during a single quarter of quantity of controlled material required to produce a minimum practicable production quantity of a product, even though the customer's requirements for that product may run over several quarters. (CMP Reg. No. 1)

AIRFRAME TUBING: Restrictions on acceptance of deliveries of alloy steel airframe and engine tubing have been eased by WPB. Aircraft manufacturers, if their current inventories are below a 60-day supply, may accept delivery of a quantity of any item of steel airframe or engine tubing not to exceed 5000 pounds or 10,000 feet or a minimum mill production run, whichever is smallest. (CMP No. 2)

L ORDERS

TRACK LAYING TRACTORS: Purchasers now are permitted to buy on the same certificate repair parts for more than one tractor belonging to him. Dealers may group purchase orders for repair parts in one order to the producer, regardless of the category of use for which the repair part is intended. Sale or repair parts may be made to repair worn or damaged parts or sub-assemblies. Provision requiring purchaser of repair parts to retain the used parts that are being replaced is eliminated. (L-53-b)

SUPPLIERS: All suppliers whose total inventory at cost is less than $35,000 are exempt from provisions of order L-63 (Supplier's Inventory Limitation). For suppliers located in specified western states, inventories are limited to total dollar value at cost equal to sales of same type of supplies during the four preceding months. For suppliers located in all other states and in District of Columbia, inventories are limited to sales in preceding three months. (L-63)

ELECTRIC APPLIANCES: Complete revision of original limitation order has been made, providing for manufacture of several more kinds of appliances for preferred orders and for limited production of certain kinds of heavy-duty appliances for commercial civilian use. Control over production of repair parts is tightened. The order: Bans production of repair parts for luxury electric appliances; adds flat irons, air heaters and water heaters to list of appliances that may be made for preferred orders. Specific authorization must be obtained from WPB for transfer of new commercial and heavy-duty appliances; limits use of copper in new appliances to minimum amounts needed for conducting electricity or for proper functioning of parts and in repair parts to certain parts of certain types of appliances; prohibits replacement cord sets, except for electric flat irons and then limited to 25% of 1940 output until end of year and to 25% every six months thereafter; forbids manufacturers to transfer or use the chromium and nickel in their inventories of repair parts without specific authorization from WPB. Applications to use or transfer must be filed on form WPB-1319 (formerly PD-556). Manufacturers must file production and delivery schedules for each month on WPB-1600 (formerly PD-655) by 10th of succeeding month. (L-63)

REFRIGERATION: Restrictions on use of steel in production of refrigerating equipment have been eased. Schedule II of order L-126 now permits manufacture of specified types of water-cooled condensing units; permits use of carbon steel for condensing unit bases to extent of 30 lb. per horsepower and an unlimited amount of cast iron; removes restriction on use of steel for fan shrouds. (L-126)

ARMORED CABLE: Amendment to order L-165 prohibiting manufacture of cable as defined has been revoked. Under present terms, manufacture of "BX" cable used as a conductor of electricity in interior wiring systems is prohibited. (L-165)

INDEX OF ORDER REVISIONS

Subject	Designation
Airframe Tubing	CMP No. 2
Appliances, Electrical	L-65
Bars, Steel	CMP No. 1
Cable, Armored	L-165
Calcium Carbide	M-190
Circuit-Breaker Equipment	L-300
Copper in Radios	M-9-c
Fans and Blowers	L-280
Gages, Pressure	L-268
Generators	L-221
Housing Projects	P-55
Motor Controllers	L-250
Production Schedules	CMP No. 1
Pumps, Liquid	L-246
Refrigeration	L-126
Spectacles	L-214
Steel Warehouses	M-21-b-1
Suppliers	L-63
Tinned Scrap	M-325
Track Laying Tractors	L-53-b
Wire, Steel Stitching	L-291
Price Regulation	
Brass Mill Products	No. 408
Machinery	No. 136
Steel Castings	No. 41

SPECTACLES: Use of optical metal (an alloy containing approximately 90% copper, 4% zinc, 6% tin) or brass as an innerliner in gold-filled or rolled gold construction parts, and silver brazing alloy to extent required in metal spectacleware is now permitted. (L-214)

GENERATORS: Purchasers of machinery into which is incorporated a special electric motor or generator need no longer file a certification setting forth the use and purpose of the motor or generator. (L-221)

LIQUID PUMPS: Order L-246 has been amended to exempt following items from definition of liquid pumps, in addition to the eight exempted categories already listed: "Pumps used in the operation of passenger automobiles, trucks, truck trailers, passenger carriers, off-the-highway motor vehicles and motorized fire equipment, as defined in Limitation Order L-158, or in the operation of any internal combustion engine." (L-246)

MOTOR CONTROLLERS: Requirement that purchase orders for electric elevator controllers or parts of controllers must bear a preference rating of AA-5 or higher has been eliminated. Controllers for motorized fire equipment are added to list of uses exempt from provisions of the order. (L-250)

PRESSURE GAGES: "Case and bezel or slip ring of pressure gages" have been removed from L-268's list of parts in which use of nonferrous metals or stainless steel is prohibited. These items are covered by order L-272, Schedule IV. (L-268)

FANS AND BLOWERS: Provision requiring manufacturers to file monthly detailed delivery schedules has been deleted from order L-280. Selected manufacturers now file delivery schedules on PD-901 under terms of general scheduling order M-293. Acceptance and delivery of purchase orders are restricted to those rated AA-5 or higher. (L-280)

STEEL STITCHING WIRE: Order controlling wire as used in binding printed and blank paper has been revoked, pending issuance of a new order. (L-291)

CIRCUIT-BREAKER EQUIPMENT: A new WPB order, L-300, eliminates manufacture of electric circuit breakers of certain trip element amperage ratings designated in the order; prohibits manufacture of certain attachments to breakers; restricts required testing of breakers to tests and calibrations prescribed in Federal and Navy specifications. On and after June 24 no purchase order for circuit breakers may be accepted or delivered unless it bears rating of AA-5 or higher. (L-300)

M ORDERS

COPPER IN RADIOS: Use of copper in production of radio sets and parts for private use, when manufacture is permitted under order L-265, is approved by WPB. (M-9-c)

GENERAL STEEL WAREHOUSES: A system has been set up under which warehouses may accept restricted deliveries of normalized or heat-treated steel bars after Oct. 1. Deliveries will be permitted in each month of the last quarter of 1943 equal to average deliveries from stock in the first four months of 1943. (M-21-b-1)

CALCIUM CARBIDE: Necessity for certification for delivery of not more than 10 tons in any month has been eliminated. No person who is required to obtain specific authorization or direction in writing from WPB to receive or use calcium carbide for generation of acetylene may accept or fill any order for acetylene for a purpose other than welding or cutting unless the person placing the order shall have furnished him or WPB with a certificate showing intended use. (M-190)

TINNED SCRAP: A new order, M-325, replacing M-72-a, prohibits delivery of tinned scrap to iron and steel producers; authorizes movement of tin plate clippings to detinning plants; permits other persons to acquire used tin cans if approval is obtained from WPB after filing form WPB-2825; requires collection of segregated tin cans by municipalities and other rubbish collectors in certain designated areas. (M-325)

P ORDERS

HOUSING PROJECTS: All outstanding P-55 preference rating orders, except those which qualify under Controlled Materials Plan, have been revoked, effective on expiration of the P-55 order or on July 15, whichever is later. Revocation order applies to war housing preference rating orders issued under earlier priorities procedures, where the builder has not taken steps to qualify his project under CMP procedures. The revocation order does not affect outstanding P-55-b preference rating orders or to builders whose structures are authorized on CMP-4-C or CMP-H-1 forms. If a builder holding a P-55 order files a CMP-H-1 form, requesting NHA to allot controlled materials, before expiration of his P-55 order or July 15, the revocation order will not take effect unless the CMP-H-1 application is denied. A builder holding an expired P-55 order which has not been specifically revoked also may file on or before July 15 a CMP-H-1 application for controlled materials for the structures covered by the order. (P-55)

PRICE REGULATIONS

STEEL CASTINGS: Maximum prices for machining performed by a producer are established on basis of his March 31, 1942, rates or on his base period cost and profit margin. Maximum charges for machining performed by an independent machine shop are based on costs plus the mark-up on March 31, 1942. Amendment to price schedule No. 41 also re-establishes prices for "miscellaneous castings" classifications; establishes specific weight differentials for light castings; establishes maximum prices for chocks, bollards, bitts and cleats as the individual producer's July 15, 1941, price, or the price listed in Comprehensive Report of the Steel Founders' Society of America for the Third Quarter of 1941, whichever is higher. Amendment is effective June 28. See page 138 for additional details. (No. 41)

MACHINERY: Wholesalers of machinery have been provided with new methods for obtaining adjustments of maximum prices. Tests of essentiality are spelled out specifically in an amendment to price regulation No. 136 as are various factors of costs, prices and competitive data which OPA will consider in reviewing applications for adjustment. (No. 136)

BRASS MILL PRODUCTS: New price regulation No. 408 stabilizes distributors' maximum prices for products and services at October, 1941, levels and permits continuation of distributors' mark-ups over mill prices existing at this time up to 3 cents a pound on all items except pipe or water tube which take the discounts from list price applicable to consumers as stated in current mill price catalogs. The order is effective July 19. Please turn to page 144 for details. (No. 408)

Gold Mine Closing Order To Remain in Effect

War Production Board has decided to continue order L-208 in effect. The order closed nonessential gold mines.

Evidence submitted to WPB revealed that the closing order has resulted in an increase in available labor supplies and stepped up production of other critical minerals such as copper, zinc and lead.

Right to appeal for exemption is allowed only if: (a) Critical material output of the individual mine makes an equal or larger contribution to the war effort than the materials and labor absorbed in operations, and (b) necessary labor can be obtained without drawing upon any essential war activity.

Manufacturers Directed To Reserve Portion of Output for Farm Outlets

MANUFACTURERS and wholesalers have been instructed by the War Production Board to set aside for sale to farm distribution outlets specific quantities of some 50 hard-to-get items needed on farms.

This action was taken in the form of directives to some 500 manufacturers and a supplementary order applicable to wholesalers. It puts into effect an emergency program worked out under WPB's Office of Civilian Requirements to make available at retail outlets serving farmers, supplies needed to increase food production.

The directives require manufacturers to disregard for a limited period preference ratings (other than AAA) on orders for listed farm supplies to the extent necessary to fill orders from farm distributors up to a specified amount. The amount varies with the item and in some instances with companies manufacturing the same item. The limited period in most cases runs from June 15 to Sept. 1; a few run to Sept. 15. It is expected that by September the long-range program will have been put into operation, making the emergency program no longer necessary.

Supplementary order No. 2 to M-330 requires wholesalers who regularly supply farm distribution outlets to set aside out of inventory and future shipments a specific percentage of each item on the list. The percentage varies from 6 to 90 per cent.

Appointments-Resignations

Ralph J. Cordiner has resigned as a vice chairman of the War Production Board.

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David F. Austin, has resigned as assistant director for production, Steel Division, WPB. Mr. Austin is resuming vice presidency of Carnegie-Illinois Steel Corp.

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Samuel A. Hobart, chief, Iron Ore Section, Steel Division, War Production Board, has left Washington because of illness. He is a consulting engineer of Pottstown, Pa.

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Joe Tucker has resigned as director of the Canadian Division, Bureau of Distribution. Before coming to Washington he was vice president and general sales manager of the Oliver Farm Equipment Co., Chicago. Hugh Porter will assume Mr. Tucker's duties as acting director of the Division.

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Charles E. Hohlhepp has been appointed director of the Program Bureau, War Production Board, following the resignation of John F. Fennelly who has been appointed executive director of the committee for economic development, a private organization sponsored by the Department of Commerce.

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Truman P. Handy has been appointed deputy chairman of Smaller War Plant Corp. He was previously director of Consumer Goods Bureau, WPB.

Restrictions on Use of Metals Tightened by WPB

In addition to actions summarized on this and the preceding pages, War Production Board last week made the following revisions in orders: Curtailed civilian use of copper and copper base alloy plumbing fixtures, fittings and trim, access panels, anchors and dowel, drip pans, fences, gates, flashings, lightning rods, cables and many other items; limited new installations of telegraph equipment, ordered conservation of all equipment by telegraph and cable companies and further restricted manufacture and installation of rigid electrical conduit, metallic tubing, flexible metal conduit or tubing, and race ways; prohibited use of copper and copper-base alloys in manufacture of military insignia, even to fill prime contract or purchase order from military services, except after appeal to WPB.

Twenty-Three District Offices of WPB Closed

Twenty-three of WPB's 123 district offices closed June 15. Besides effecting a saving in money, the cut will result in the maximum utilization of WPB personnel, says Wade T. Childress, deputy vice chairman for field operations.

These are the offices affected: Lowell, Fall River, and New Bedford, Mass.; Camden, N. J.; Chester, Lancaster, Norristown, York, Wilkes-Barre, Reading, Johnstown, and Williamsport, Pa.; Chattanooga, Tenn.; Greenville, S. C.; Mobile, Ala.; Miami, Fla.; Wheeling, W. Va.; Roanoke, Va.; Iron Mountain, Mich.; Fort Smith, Ark.; Shreveport, La.; Fresno and Oakland, Calif.

WINDOWS of WASHINGTON

Gets the Nod

AFTER 18 months research, Army Quartermaster Corps has given the nod to compression of dehydrated foods. A high-speed, high-compression hydraulic press built by Baldwin-Southwark Division, Baldwin Locomotive Works, Eddystone, Pa., is being installed at the plant of the E. A. Couture Co., Modesto, Calif., where it is to be employed in compressing dehydrated vegetables.

The Army Quartermaster Corps, with a press built by the Cambridge Tile Co., Cincinnati, is able to obtain powdered eggs whose volume by dehydration has been reduced some 90 per cent and whose volume is being reduced 50 per cent more by compression. Presses shortly will be ordered by the Quartermaster Corps which will reduce oatmeal to 20 to 25 per cent of its original volume. Other manufacturers who have designed high-speed, high-compression hydraulic units on experimental orders from the Office of Lend Lease Administration include the Auto Ordnance Co., Greenwich, Conn., the E. G. Loomis Co., Newark, N. J., and the Johnson Coal Cubing Co., Detroit.

Leftover Feast

In the past few weeks, the Army has tightened up sharply on food. "All leftovers from one meal are served the next," reports one private. "Soups are made from whatever happens to be left over. Hot coffee left over in the morning is served cold at noon and night. We get leftover meat in every imaginable way. Stale bread comes back as bread pudding. You can trace some food through four or five days. On top of this, woe betide the fellow who comes out of the mess hall with anything—absolutely anything—left in his mess gear. There is a NCO to check each plate."

Gentle Hint

When writing to congressmen in connection with pending or desired legislation—and it engages in such activities on an impressive scale—the United Automobile Workers-CIO carries this warning on its letterheads: "We're keeping score for '44".

Improvement

Study of rail movements shows that the slowdown early this year has been eliminated and cars again are being turned around as fast as at this time last year. The improvement set in during April. Trunk lines north of the Ohio, from Chicago and St. Louis to the East, are operating at capacity due to the petroleum movement and this congestion will continue. The industrialization of the southeastern states is testing transportation facilities in that area to near capacity. Since the war turned west about May 1, the load on transcontinental roads to the West Coast has approached capacity and this situation will become an acute problem in the future.

Not All Wrong

Elimination of cross-hauling on the railroads has not made a great deal of progress in the opinion of the Office of Defense Transportation. At the same time, ODT takes the view that the development of our distribution methods has been based in the past upon sound business principles; it does not feel that the system is all wrong or that it necessarily should be rebuilt. ODT would like to see further reduction of short-hauling on an emergency basis in order to conserve our transportation capacity for maximum war service, but it is loathe to take any arbitrary action. It is leaving the problem largely to the War Production Board industry advisory committees. ODT checks reveal that some good results are being had. For example, a certain amount of steel cross-hauling has been eliminated by allocating tonnage to favorably located mills. On the whole, however, established distribution methods have not been greatly changed.

Premature?

Many Washington officials when questioned about postwar planning, frown and declare discussion of the subject is premature. The thing to do now is concentrate on war production, they say. Too many industrialists are inclined to coast, thinking the peak is passed. Washington claims the 1944 war program will even eclipse the $83,000,000,000 total for 1943—based upon known programs. In the meantime, industry is going right ahead with its postwar planning. One company in the refrigerator field, for instance, expects to replace a forged evaporator part with one fabricated from a section of aluminum sheet to which a piece of tubing will be brazed. Purpose is to cut costs.

Not in Groove

CMP still is not sufficiently "grooved" to make certain of actual requirements of steel and to detect duplications in orders, states an important official. The claimant agencies actually have been allotted more steel than is likely to be available for third quarter and the Requirements Committee faces the job of forcing the necessary adjustments. On paper, there appears to be a deficit of 6,500,000 in steel for third period but those who know claim the total is nearer 1,000,000 tons.

WAR CONTRACTORS RESTRAIN COMPLAINTS

BECAUSE war contractors individually do not wish to become unpopular with the armed forces those affected by recent "stop" and "slowdown" orders are not talking out loud about the difficult position in which some of them have been placed in reference to equipment rendered idle and inventories of materials and parts.

Since last November tanks and certain other items have been cut back substantially; it is likely these cancellations have aggregated in the neighborhood of $1,000,000,000. Liquidations have been effected in some cases but most of them, particularly the larger ones, still are pending. A stage has been reached where some of the larger contractors involved feel continued postponement of final action will have serious dislocating effects.

In one instance arrangements were made by the procurement agency involved whereby the parts inventory of one contractor was to be transferred to the plant of another contractor engaged in manufacturing the same end product. This did not prove entirely satisfactory. There was some confusion over absorption of the cost of transferring the parts to the receiving contractor. Then, the second contractor who was not cut back had made arrangements for his own supply of materials and parts, so that taking over the inventory from the cut back contractor made it necessary to rearrange his own supply situation drastically.

These complications are highly upsetting to the large prime contractors. They are much more disturbing to the many smaller subcontractors.

Switches in the war production program will continually be with us during the war, and a huge volume of cancellations can be expected at the war's end. Unless ways and means are found to provide fair compensation and assistance to companies whose plants are made idle by cutbacks, much economic distress will result.

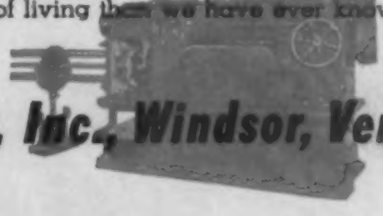
Nature's most tragic mistake

THE POSSUM'S LITTER consists of 18 babies. But mother possum can only accommodate 12. At birth, there's a mad scramble for the 12 nipples, and the first arrivals don't budge **for 6 weeks!** The other 6 babies just look on... and die of starvation.

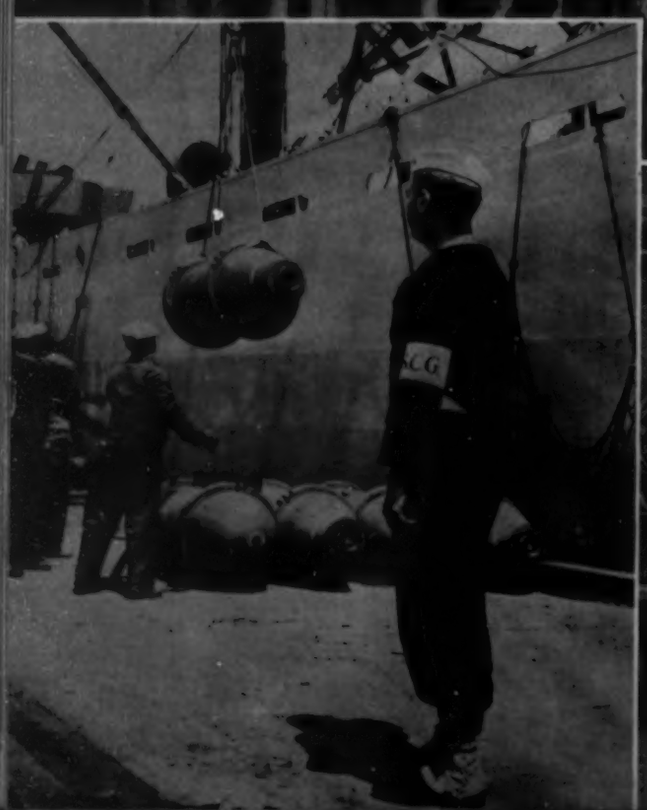
What an ironic circumstance! A mother forced by fate to watch her own babies starve! And what a pointed illustration of the ruthlessness of Nature. In Nature and in business, the fight for survival is equally vital. Failure to keep abreast of changing conditions has invariably doomed the less alert industrials to business death.

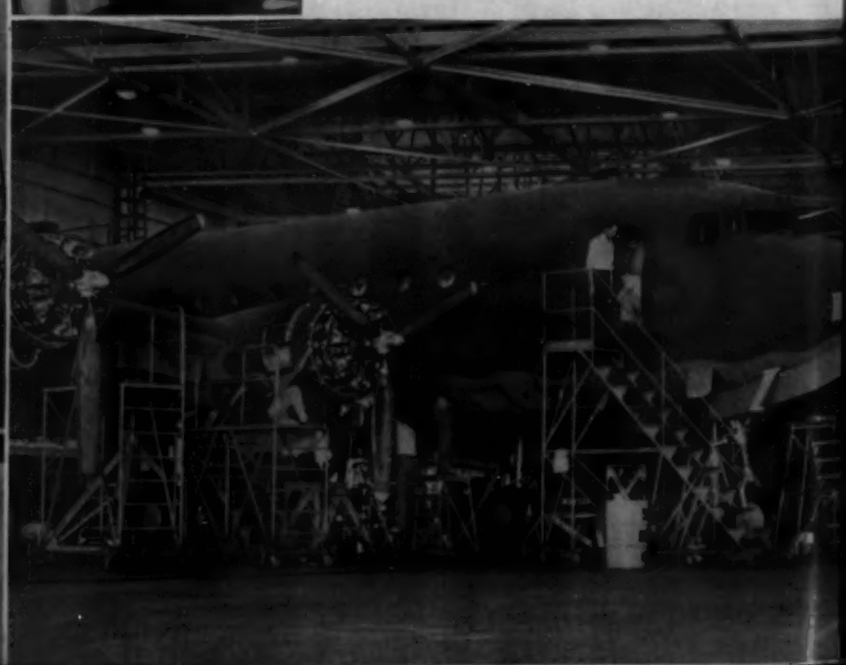
Because they affect almost everything we touch, machine tools will be more necessary than ever in the post-war era. Machine tools are essential today to the output of the food you eat, the clothes you wear, your automobile, your vacuum cleaner, your washing machine, your refrigerator. Machine tools not only create new industries, but they create employment. They are largely responsible for our present way of life... unequalled by any other country in the world.

In our post-war era, Cone Automatic Multiple Spindle Lathes will be even more essential than they are now. Their unique advantages will help bring us all higher standards of living than we have ever known before.



CONE Automatic Machine Company, Inc., Windsor, Vermont





Production

MANY manufacturers have developed a state of mind that threatens successful prosecution of the war, states a high official of the War Production Board. They are under the impression we now have arrived at that stage in war production where we can coast the rest of the way.

This state of mind, according to this official, is evidently the result of recent cutbacks in contracts, particularly tank contracts. In any event it is not warranted for the reason that cutbacks in any one or more programs are accompanied by drives to increase production of other programs, including new ones.

To illustrate, this official points out that whereas the production of military items in 1943 was set at $83,000,000,000, actually only 19 per cent of this volume was produced in the first quarter and about 22 per cent is being produced in the second quarter. That leaves 59 per cent of the year's total to be produced in the last half.

He points out that the schedule was set up in that way for the reason many new plants were to be completed or tooled up in the first half, so that allowance for their getting into production during the second half was made. He adds that the established goals for 1944—and he says "we know all the programs"—are far in excess of 1943.

Just as rapidly as possible those plants that are slowed down or rendered idle by cutbacks are converted to other war production. This is not always easy. One tank plant has been cut back by 50 per cent and it is difficult to find other work for it. At another tank plant there will

n Moves in Step With Strategy Changes

Program reshuffling inevitable in fitting facilities to changing needs of battle. Contract cancellations accompany de emphasis on some items and intensification of effort on other goods. Misconceptions as to effect unwarranted

be a 2 to 3-month delay in swinging over to the production of certain aluminum parts for aircraft but this new item will absorb all of the available space and labor. A steel foundry that made cast steel tank turrets, has turned over to production of castings for valves and turbines. There are vast difficulties in finding work for subcontractors who made tank parts. Some tankbuilders have had a 100 per cent increase in demand for agricultural machinery and equipment to increase output of war crops. A very substantial increase in demand for railroad cars and locomotives is helping a number of tank plants to find new work.

In an overall way, the tank cutback is not as dislocating to the war industry as many people believe since it involves only some 1 to 2 per cent of the total war business.

Some trouble is being encountered in the switch to bombs of the block buster type. Many of the manufacturers of small bombs of the past cannot make block busters with their present facilities. Work must be provided to keep these plants and their workers fully occupied. The managements involved in such cutbacks, according to this official, can help themselves and the war program if they will use their imaginations and be aggressive in the search for such contracts or subcontracts as they are fitted to execute.

This is a matter of importance, because cutbacks are going to be with us as long as the war lasts. Just as tanks lost much of their value when they began to be knocked out by mobile artillery, thereby placing emphasis on production of more mobile artillery, so the fluidity of war requirements will continue to bring changes. Manufacturers in general, therefore, will do well to study all possibilities for changing their plants over to other work in the event that the programs on which they now are engaged are cutback. The strategy of our enemies determines our needs—and there is no means of knowing where the cutbacks of the future will show up. Therefore, the current stress on particular programs is worthy of careful study.

Aircraft Program Most Important

The leading program at present is that involving aviation. Production of planes in 1943 will be 100 per cent greater than in 1942 in the number of planes but that does not tell the story. The weight of the planes being built in 1943 is three times the weight of the 1942 planes. In May production of planes exceeded 7000 while production in June is expected to exceed 8000. The aircraft industry now employs more than 1,000,000 persons. This is to be increased month by month. There are no limits on the drive to step up airplane production to the absolute maximum. Hence many manufacturers suffering from cutbacks should study the possibilities of getting aircraft work.

One factor that has been holding back aircraft frame production and that will have been overcome in the next 60 to 90 days has to do with production of extrusions and forgings. Presses did not until recently receive the priorities attention they required; this matter since has become much more pressing owing to the increased extent to which aircraft frame builders have increased the number of parts made as extrusions and forgings. The presses now are being installed rapidly and this means that by August or September all parts used in airframe construction will be in much greater demand. In this connection it is pointed out that large new capacity for airframe production still is to be placed in operation.

Another program that is to be driven to absolute maximum is that involving construction of ships. May production of cargo vessels came to some 1,750,000 deadweight tons and it is hoped this figure will be exceeded in June and in every succeeding month in 1943 and 1944. Production of combat ships, and especially of various types of escort craft, is being pushed with equal effectiveness. More workers are to be engaged at shipyards and at many plants that supply shipyards. Many opportunities to enlist in the shipbuilding program, therefore should open up to more and more manufacturers. As an example, many more electrical workers will be needed for doing electric wir-

Output of ships, heavy bomber and transport planes, explosives, etc., intensified as war machine's demands shift production emphasis from tanks and certain other types of equipment—NEA photos

ing work in connection with ship construction.

Laundry machinery also now is in increased demand not only for improving domestic service but also for use of the Army and Navy, thus offering opportunities to many manufacturers.

One of the programs that might be revised at any time due to technical developments involves production of torpedoes of various types. Many manufacturers might find in such switches opportunities to book subcontracts for parts. This same statement may be made in reference to bombs about which new data constantly are developed.

Many reports, this official goes on to say, have concerned themselves with the vast quantities of materiel of one kind or another that have accumulated. He points out that in the capture of one strategic island we shot off more ammunition in four or five days than we had expended in a number of months previous. We still have the real "shooting" war ahead of us, he declares, adding that as we get into the real shooting war these piles of stored ammunition and materiel of one sort and another will tend to disappear.

Shortages of metals and other critical materials, this spokesman points out, will become exceedingly acute in the last half for the reason that so many plants that have been under construction now are approaching the stage of being ready to get into production. He looks for the 1943 production peak to come in December, with 1944 goals calling for still higher peaks. This spokesman is somewhat cheerful over the outlook for the labor supply. In addition to the women workers who are still available, large numbers of men who labored on the construction phase of the war production program now are being relieved and are becoming available to go into production line jobs.

Shortage of critical metals, he says, will prevent or reduce much desired production. The Russians, for example, want large additional numbers of machine tools. These demands must be denied for the present because of the other more pressing needs for metals.

As part of the campaign to dissipate the impression that pressure for more war production is easing, the war production drive is to be rejuvenated in a big way. This outfit is drafting a program aimed at stimulating management and labor all over the country to increase the pressure behind the war production program. Signs of the new drive are expected to become apparent within a week. As part of this drive manufacturers will be urged not to allow postwar planning to interfere with intensification of war production. They will be urged to produce in such volume that they will be able "to look our soldiers and sailors in the face when they return from the battle fronts."

NEW WAR MACHINE—This Sikorsky helicopter will be produced in quantity. It recently underwent exhaustive Army tests and hopes are held high for its success in fighting off the U-boat threat to shipping

With a view to determining the extent of production cutbacks and their effect on industrial operations at various points, STEEL's district representatives were asked to survey conditions in their areas. Their reports are summarized as follows:

CHICAGO—Although much has been heard about early resumption in the manufacture of some types of civilian goods, no definite steps along this line have been taken and none are known to be close at hand. The subject provides a good topic of conversation, however, because many contracts for war goods have been canceled or reduced, and because Donald Nelson, head of WPB, has intimated on several occasions recently that sound economy requires that production of essential civilian goods be interfered with as little as possible.

There are evidences war goods production is being reduced significantly and men are being laid off in keeping with restricted programs. In this area, sharpest curtailment has taken place in production of tanks, tank elements and armor; bomb casings; and airplane landing mats. Most recent is the laying off of approximately 900 workers at the Gary armor plate plant of Carnegie-Illinois Steel Corp., which has been making tank armor. New contracts for other war items to absorb these men have not been placed.

Substantiating this downward trend in production is the fact one steelmaker last month received cancellations for steel equal to one-half of new tonnage booked, and this rate is being maintained so far this month. This has created a rather serious problem in the scheduling of rollings since cancellations frequently are received at the last minute.

This would seem to indicate steel demand is almost over the hump, if not already over. Farm implement makers have been given increased allocations of steel, but this is more likely result of bad judgment in the original program than improvement in steel supply. Railroads, on the other hand, have had their modest requirements cut down and have been told they can expect nothing additional during the remainder of the year. At the same time, WPB spokesmen within the past few days have announced production of finished steel in third quarter will fall about 1,000,000 tons short of requirements, thus making it imperative to rush to completion various steelmaking expansion programs.

All of which makes a most confusing situation, and one can find adequate support for whichever side of the question he chooses. Among well-informed steel executives, however, there is a feel-

FIELD OF DEATH—Row on row, these 2000-pound blockbusters await shipment to Allied airmen. Thousands of these "agents of death" will be required to finish off the Axis quickly and effectively. NEA photo

ing that the situation is not as black as it looks. They think claims of finished steel shortage in third quarter are largely a matter of support for the tremendous expansion program originally undertaken, and which likely will prove to be an overexpansion. They feel, too, that inventories of steel in consumers' hands are larger than generally supposed. As a result, they suspect that within 60 to 90 days steel supply will be found adequate to permit production of civilian goods to be resumed on a moderate scale.

BUFFALO—Many war plants here mostly small ones, have been affected by cutbacks in government contracts.

Business already placed is not being canceled but numerous plants report that renewals are not coming through. As a result, plants are not particularly hurrying to complete contracts on hand. This is apparent, as one of the local labor leaders complains that his men are working fewer hours. In other instances, workers are reported being taken from their top skilled jobs, and placed in jobs of lesser importance.

These who should know the situation, however, claim that such reports do not necessarily mean any overall cutback in war production.

CINCINNATI—Steady conversion of manufacturing facilities has been going on in this district for several months and further conversion, because of changes in war needs, are in prospect. Transitions have been gradual, and so far there has been no evidence of an abrupt disturbance.

Feverish demand for machine tools has subsided. Shops, however, are busy and any decrease in employment is chiefly due to lack of replacements for men drafted and others shifting about as heretofore.

With two exceptions, industrial leaders foresee only slim chance for an early expansion in consumer goods production as a means of absorbing equipment available for re-conversion. More liberal quotas for agricultural implements and for stoves are anticipated.

BIRMINGHAM, ALA.—Survey of this district shows little to substantiate reports of slowing down of war industries. As a matter of fact, the opposite seems to be true except in remote instances.

Continental Gin Co. reports it is worried only by inability to obtain materials and additional help. Goslin-Birmingham Co. has felt no slowing down and has not been affected by cancellation of contracts. Some producers of smaller shells may have been affected. Hardie Tynes Mfg. Co., engaged largely in work for the Navy, is booked through 1944.

Tank production is virtually stopped, but that is a small item here.

BOSTON—In New England while one ordnance plant has been ordered on a standby schedule, outright cancellations and curtailments of war production programs are not yet serious. Workers at the one affected ordnance plant, previously engaged largely in shell loading, have been mostly absorbed at nearby shipyards on essential war jobs.

Revisions in the production program which have brought about limited restrictions are manifest mostly in a slackening of subcontracting. Prime contractors in some lines, including the machine tool industry, are calling in more work previously farmed out to maintain their own operating schedules and organizations. The net result is more small shops are looking for subcontracts but those equipped to aid in the shipbuilding and aircraft industries are not affected.

One cutback of a prime contract has affected a firearms manufacturer at New Haven, Conn., making submachine guns. This plant has open capacity for profiling, power drilling, turret lathe work, spline milling and other precision machining. Close to 35 plants mostly in New England have been doing subcontracting work on this prime contract.

PITTSBURGH—Only layoffs here due to cutbacks are in steel foundries working on tank armor and shell plants. Neither of these can be reconverted. Some talk of converting from one type of war goods to another is heard, particularly some of the tank shops, but nothing concrete has developed along this line as yet. The local situation is not typical of the nation generally because no local plants are doing final assembly work, most being subcontractors on a variety of programs, only a few of which have been cut.

Critics of Act Point Out Lack Of Postwar Changeover Provision

Important changes in legislation and the manner in which it is administered considered likely if Congress gives sympathetic ear to complaints registered at House Naval Affairs Committee hearing

IMPORTANT changes in the Contracts Renegotiation Act and the manner in which it is administered are in store if Congress heeds the advice that has been registered with the House Committee on Naval Affairs in hearings held over the past two weeks.

Substantial number of witnesses spoke critically about the fact that when the Navy Price Adjustment Board renegotiates it considers only profits before taxes and makes absolutely no provision for the contractor's postwar changeover.

A typical witness who expressed this view was J. F. Metten, chairman, New York Shipbuilding Corp., Camden, N. J. Price renegotiation saved his company much clerical work which would have been necessary to determine costs which were changing continually as naval craft designs were altered on the basis of battle experience; there were many of these changes—as changing into aircraft carriers vessels originally slated to be cruisers.

Commends Board's Work

"The board did a good job," said Mr. Metten. "They sent qualified people up to the yard and of course this is a highly technical and very much involved subject—these changes—and they got the information in detail from the yard and we went down there before them and discussed various points. Of course, you never agree on anything, but on the whole we felt that they had been fair and impartial and of course in our position we would have had to go through that with some sort of Compensation Board of the Navy to straighten this out."

As a result of renegotiation, the profits of New York Shipbuilding Corp. averaged 2 to 2.5 per cent after taxes.

One of the committee members in questioning Mr. Metten about the validity of his postwar fears pointed out that the government had furnished $17,000,000 to expand and improve the shipyard and that the company had amortized this expansion and improvement and that if the war goes on another three years the company will own it. He wanted to know if that would not put the company in a pretty good position.

"What we are worrying about is how we are going to shrink from 30,000 men to a normal force after the war," responded Mr. Metten. He admitted that the postwar reserve provided in the excess profits tax was of some comfort but thought it would be good insurance for his company and its employes if a larger share of the war profits could be siphoned into the postwar reserve.

While there is some bickering between Republicans and Democrats who compose this committee it perhaps was significant that Congressman Melvin J. Maas (R.) of Minnesota remarked during the examination that he cannot understand why renegotiation is done before instead of after taxes. The board may renegotiate to the point where after taxes there might be an actual loss, he said; he also expressed worry about the economic aspects of renegotiation after the war.

A recommendation made by Earl O. Shreve, vice president, General Electric Co., Schenectady, N. Y., made an impression on the committee. He objected to renegotiation because it takes too much time.

"It leaves the books open until final judgment is passed and in these uncertain times that leads to a lot of nervousness," he said. "Renegotiation," he added, "diverts the attention of so many people from production."

Mr. Shreve thought it would be wise to eliminate the recapture feature from the Contracts Renegotiation Act and legislate it into the Revenue Act. He thought that this automatically would eliminate 90 to 95 per cent of renegotiation. The remaining 5 to 10 per cent of the contractors are those who operate government property on a fee basis; these could be taken care of by a special super excess profits tax, or they could be handled by the board.

GE Accumulates Reserve

Questioned about $17,000,000 postwar reserve which General Electric Co. accumulated during 1942 under the provisions of the Revenue Act, Mr. Shreve thought that the GE reserve will be sufficient for this company's postwar transition "unless something entirely unforeseen develops" but he added that he was talking about General Electric only and not for business and industry in general.

Harry J. Defoe, Defoe Shipbuilding Co., Bay City, Mich., made this recommendation:

"The Renegotiation Act, if left to stand, should be amended so that price adjustments are based on profits after taxes, that a floor for profits after taxes should be set below which renegotiation should not go, that definite consideration should be given for extra efficiency on the part of the contractor and that there should be provision for post war reconversion."

Now under renegotiation, Mr. Defoe said that he and three other top members of his organization have spent more than one month each in actual hours in working up information for the Navy board. Mr. Defoe thought his company should be entitled to 3 per cent profit on gross sales after taxes. Instead, he was allowed to make $734,000 after taxes on some $22,000,000 Navy business in 1942.

"Here we are facing $110,000,000 of unfinished contracts with $740,000 in our pockets to do it with. Our payroll comes to $200,000 a week. One slip could cost the whole $734,000."

Adding insult to injury, he declared, the Treasury Department insists on ruling that the frames on which the company builds Navy boats by the "upside down" method represent capital improvement—this despite the fact that these frames will lose their usefulness as soon as the Navy contracts are completed.

Poor Credit Risk

John B. Hawley Jr., Northern Ordnance Inc., Fridley, Minn., told the committee that he recently wrote to "every single subcontractor and every source of supply that 'we have $1,000,000 of paid-in capital; we expect to go broke at the end of the war; we have a $23,000,000 inventory, and if you want to sell us anything on credit you are crazy'."

Mr. Hawley did not like anything about the present renegotiation setup. It takes too long. It diverts too much time from production; time spent by his organization in making the detailed inventory which the Navy Price Adjustment Board requires cost lost production of substantially 100 gun mounts for merchant ships at a time when these gun mounts were urgently needed. He does not like renegotiation of profits before taxes; "there is no such a thing as a profit before taxes."

"Good management becomes a liability under contract renegotiation," declared Mr. Hawley. "I spent $1,000,000 in three years to develop a ship steering gear pump. I get $10,000 for the pump. In price adjustment we will get 13 per cent on the cost, or something

like that; call it $1000 in round figures after renegotiation. The state and federal tax men take $830, leaving me $170. I take the full responsibility of steering a ship not only forward but full speed astern—the most difficult piece of machinery probably in the ship. I am doing that for $170. Do I believe in renegotiation? No, not on that basis."

A bad feature about renegotiation is the failure of the boards to set up any rules or classifications. He thinks that shipbuilders should be assured that when they come in for renegotiation they will be allowed at least 1.5 per cent profit after taxes; airplane builders should have assurance that they will retain at least 2 per cent after taxes; machine tool builders should have assurance, perhaps, of retaining 4 per cent after taxes. In his own case, said Mr. Hawley, he was allowed to retain about 2 per cent after taxes whereas it is his opinion that he should have been allowed to retain at least 3 per cent after taxes.

When the Navy Price Adjustment Board looked at Northern Ordnance Inc., it viewed 1941 and 1942 as a whole and arrived at an arrangement by which the company would refund $16,000,000 which would be applied to the year 1942, and which would allow the company, on adjusted sales for that period, an amount of 10.4 per cent before taxes. Mr. Hawley contended that the Navy Price Adjustment Board had no legal authority for renegotiating any contract deliveries made prior to April 28, 1942, the date on which the Contracts Renegotiation Act became a law.

Another sharp criticism has to do with treatment meted out to companies that do not delay but come to the price adjustment boards voluntarily; these companies are fined for their pains, said Mr. Hawley, whereas companies that stall on renegotiation fare much better.

Run Factory Ten Days

"You are leaving me enough money to run my factory 10 days out of a year's work," complained Mr. Hawley. "How in the name of God am I going to take care of these 50,000 loyal men and women and children and at the same time utilize the taxpayers' $25,000,000 investment in the finest machine shop in the world and convert to a peacetime basis of usable products on 2 per cent after taxes?"

James F. Lincoln, president, Lincoln Electric Co., Cleveland, declared that the psychological aspects of renegotiation are unsound. Contractors do not object to reductions in profits; what they do mind is to have somebody stand over them with a club. They do not see any practical results that justify renegotiation; whereas the Navy Price Adjustment Board "recovered" some $1,800,000,000 by renegotiation actually the recovery was only $175,000,000 for the reason that the Revenue Act would have recovered the remainder.

A recommendation made by Mr. Lincoln was the subject of much questioning. This was that no company manufacturing a standard line of merchandise should be subject to renegotiation. He cited welding electrodes as an example. These electrodes are sold in normal times in competition and they continue to be sold for war purposes in competition. Hence, profits on such goods are held in check by a most effective instrument—competition. If renegotiation is to be continued, therefore, it should be limited to government financed operations and to operations where entirely new products are involved.

Mr. Lincoln laid chief stress on the necessity for preserving the incentive system. Companies are urged to go all-out in war production and those that make good records are "fined" by renegotiation.

"President Roosevelt recently said that we are out-producing the Axis—130,000,000 Americans are out-producing the Axis with a population of 500,000,000," said Mr. Lincoln. "How long are we going to be able to do that when we discourage incentive? Renegotiation is a $2 name for a very old and much used policy. The previous name for it was piecework wage cutting. Experience with it has been very costly. The pieceworker originally received a contract at so much a piece. At first he went ahead on the idea that he would get that much for all the pieces he made. However, as soon as his skill increased his earnings beyond a certain point, management cut the price."

This had a very bad effect on labor psychology, declared Mr. Lincoln, and this state of mind continues to be an important factor in preventing war production from being at as high a rate as otherwise would be possible.

"Half of our people at the Lincoln Electric Co. are stockholders and they ask me what is renegotiation and I explain it to them. They want to know how much profit is going to be taken away from them and when I tell them I do not know they say they do not like it and that they are not going to continue to put their backs into the work if the government comes in and takes away money they feel they have earned by their efficiency. They are patriotic—but that's the way people are built. In England men work for years and spend large sums of money to get a title. I warn the committee that if we fail to preserve our incentive system

(*Please turn to Page* 146)

AIRCRAFT ENGINE GEARS: To avoid finger printing these precision finished aircraft engine gears and subsequent staining of the steel, these inspectors in a Chevrolet plant, building parts for Pratt & Whitney engines, use a special lotion on their fingers before handling the parts. Twelve distinct visual and physical inspections are required on these gears, finished to a tolerance of 0.0005-inch

System Becomes Fully Operative July 1 As Transition Period Ends

Manufacturing industry urged by government officials to become familiar with details of operation. . . Additional changes in practice to cope with new situations as they arise are held to be certain

CONTROLLED MATERIALS PLAN goes into full operation July 1, following a three-month period of transition from the previous priority system.

Officials of the War Production Board admit the multitude of directives and amendments which have been issued have drastically changed the details of operation and that additional changes must be made to cope with new situations as they arise. They are urging industry to familiarize itself with operation of the plan.

"The CMP Division is making every effort possible," says Walter C. Skuce, director, "to simplify the plan, ease the burden of paper-work and compliance which industry has been called upon to bear."

Probably the most serious problem confronting CMP officials recently has been the plight of small producers of class A parts, such as screw machine products, springs, and forgings. They are being accorded special treatment, including a separate procedure for obtaining allotments of materials.

A large share of difficulties encountered by manufacturers arises not from inadequacy of the program but from their lack of knowledge of specific provisions of the CMP regulations. They have not taken full advantage of the services offered by the regional and district offices.

Fail To Use Some Provisions

For instance, manufacturers have not taken advantage of the provisions in CMP regulation No. 1 for "placing of orders for class A products requiring small quantities of controlled materials, without making allotments." A person requiring any class A product in a quantity constituting a "small order" may place on his order the applicable allotment number followed by the symbol SO. A small order means one where the aggregate amounts of controlled materials required to fill such order together with all delivery orders for the same class A product placed by the same consumer with the same manufacturer calling for delivery during the same month do not exceed the following: Carbon steel including wrought iron, 1 ton; alloy steel, 400 pounds; copper and copper base alloys, 100 pounds; and aluminum 20 pounds.

Similarly, manufacturers could operate more freely under CMP if they were more familiar with the "basketing" provision of the inventory regulation. The basis of control is placed on "item of controlled material" which means any item in any class of controlled material listed in schedule A of CMP regulation No. 2 which is different from all other items in that class by reason of one or more of its specifications, such as length, width, thickness, temper, alloy, finish, method of manufacture, etc.

Metals Consumed Efficiently

Despite confusion caused by official revisions and the manufacturers' unfamiliarity with many of the provisions, CMP has brought about a reduction in scheduled production to a level commensurate with available supplies of raw materials. Copper, steel and aluminum are being consumed fully and efficiently so far as the war program is concerned. This is the underlying principle of the program and attainment of this end probably represents its outstanding contribution to the war effort.

Under the preceding Production Requirements Plan a huge volume of orders was booked which actually could not possibly be filled due to lack of necessary supplies of manpower, plant facilities and materials. No limit was placed on amount of business which a company could book, although certain preference ratings generally were required. Pyramiding of preference ratings ultimately caused a breakdown of the system and fostered formation of CMP.

Production of war goods and essential civilian articles has increased substantially by the "freezing" of production schedules wherever required. CMP regulation No. 1 provides that a producer may not accept an authorized controlled material order if he does not expect to be able to make shipment during the month in which delivery is requested.

Controlled materials approved on application by industry division of WPB or claimant agency for delivery during a specified month may not be displaced in production schedules by any other order subsequently received, regardless of whether the second order bears a higher preference rating (unless it is an emergency AAA rating) or is accompanied with an allotment of controlled materials.

At present if they are unable to accept an order for delivery in a particular month because their production schedule for that month is full they must book the order tentatively as early as possible in the succeeding or second month following.

CMP has been in operation for less than one full calendar quarter and, therefore, final judgment of its merits must be withheld until a later date. It is paradoxical that frequent changes in details of application constitute one of its chief weaknesses and, at the same time, a distinct advantage. Changes in method of designating delivery and allotment dates, of designating certain report forms, and of classification of "B" products, etc. have proved confusing. Nevertheless, revisions have been designed to simplify the procedures which industry must use in obtaining materials for production programs. Production surely would suffer if no provision were made to correct inequalities of distribution or to furnish materials under unusual circumstances.

Chief objection of manufacturers to the present system is that it requires a company to receive an "allotment" under CMP in some instances and an "allocation" under "M" orders in others. They claim that in either case waste of material is inevitable if allotments and allocations, needed for the same program, are not synchronized with each other.

Suggests Synchronizing Control

As stated by G. A. Renard, secretary-treasurer of the National Association of Purchasing Agents: "How can a manufacturer estimate his likely steel or copper requirements before he knows how much tungsten or molybdenum will be allocated to him for certain programs and vice versa?" He suggests it would be better to synchronize these metal controls by placing them under the same procedure.

A procedure similar to the discarded PD-25A has been proposed for CMP for synchronization of requirements of the various materials and including reports and control.

It is claimed there is no way of telling how closely material allotments under CMP are geared to specific program needs or whether some arbitrary "safety margin" is applied in figuring requirements for individual programs. It was further suggested that the claimant agencies and particularly the armed services are not too keen to spell out their material requirements in detail and put them "on the line."

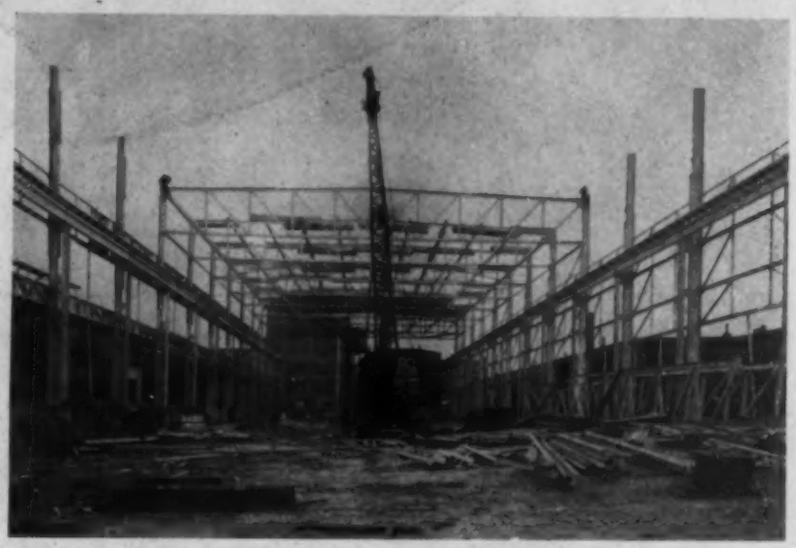
Mr. Renard also said that abuses by minorities in industries of the provisions of the maintenance, repair and operating regulations No. 5 and 5A are threatening

this system and if they do not stop, new checks would have to be developed.

"—Most of these reported abuses are quite legal in accordance with CMP regulation Nos. 5 and 5A. Thus, quite a few rejected PD-1A's have re-appeared with MRO allotment symbols. There certainly is a moral obligation involved in this new MRO set-up; it is not to purchase up to the permissible limits but to reject MRO purchases to the absolutely required minimum. If every company does that, this simple procedure will be safe for the duration of the war."

The strongest trend in government control plans now appears to be definite scheduling of products. A wire company, for instance, is now directed to produce a specified tonnage of fine wire during a given period. Another company in the same manufacturing field is instructed to produce a specified tonnage of another gage wire. This is repeated throughout the industry, covering all sizes of wire from the smallest gage to the largest cable. This procedure is expected to be followed in other industries.

Component scheduling procedure is designed to increase production of fighting equipment by getting the right component parts to the right manufacturers at the right time. General scheduling order M-293 gives the authority to freeze delivery schedules so that priorities, directives, and other procedures cannot disturb them.



SALVAGED STEEL: Construction of the latest addition to Tube Turns' plant, Louisville, Ky., is progressing without interruption by The Austin Co., Cleveland, with the use of more than a hundred tons of wrought iron salvaged from the old Louisville post office and an equal amount of used steel. The wrought iron has been used in truss webbing, bracing, eave struts, girts, and stub columns, while the 43-foot columns and top and bottom chords of the 80-foot trusses were made of the second-hand steel

WPB Appoints Industry Advisory Committees

Director of Industry Advisory Committees, War Production Board, has announced formation of the following industry advisory committees:

Used Construction Machinery

Government presiding officer is Thomas H. Ryan. Committee members: L. W. Gardner, Howard-Cooper Corp., Portland, Oreg.; C. G. Hewitt, L. B. Smith Inc., Camp Hill, Pa.; M. Hunter, Hunter Tractor & Machinery Co., Milwaukee; Charles Wehner, Mississippi Valley Equipment Co., St. Louis; W. H. Ziegler, Wm. H. Ziegler Co., Minneapolis; Edward Phillips, Phillips Machinery Co., Richmond, Va.; James L. Nellis, Choctaw Culvert & Machinery Co., Memphis, Tenn.; Goodloe Yancey, Yancey Bro. Co., Atlanta, Ga.; Lewis W. Elphinstone, D. C. Elphinstone Inc., Baltimore; H. O. Penn, H. O. Penn Machinery Co., New York.

Crown Manufacturers

Government presiding officer is C. P. Kolstedt. Committee members: E. J. Costa, Crown Cork & Seal Co., Baltimore; J. C. Feagley, Armstrong Cork Co., Lancaster, Pa.; Robert Mitchell, Mitchell & Smith Inc., Detroit; Talbot O. Freeman, Pepsi Cola Co., Long Island City, N. Y.; C. P. Edmonds, Bond Mfg. Co., Wilmington, Del.; L. C. McAuliffe, Mundet Cork Corp., Brooklyn, N. Y.; W. P. Murray, Continental Can Co., New York; R. P. Smith, Hoosier Crown Corp., Crawfordsville, Ind.

Electroplating, Anodizing Equipment

Government presiding officer is W. W. McCord. Committee members: William E. Belke, president, Belke Mfg. Co., Chicago; S. L. Cole, sales manager, Chas. F. L'Hommedieu & Sons Inc., Chicago; B. G. Daw, president, Lasalco Inc., St. Louis; O. W. Hakanson, Meaker Co., Chicago; T. W. Kirby, president, A. T. Wagner Co., Detroit; L. K. Lindahl, president, Udylite Corp., Detroit; A. J. MacDermid, president, MacDermid Inc., Waterbury, Conn.; John M. Mayers, vice-president, Frederic B. Stevens Inc., Detroit; A. P. Munning, vice-president, Munning & Munning Inc., Newark, N. J.; Van Winkle Todd, president, Hanson-Van Winkel-Munning Co., Matawan, N. J.; G. A. Spencer, president, Crown Rheostat & Supply Co., Chicago.

Rigid Electrical Conduit

Government presiding officer is W. J. Flynn. Committee members: James M. Barton, Fretz-Moon Tube Co. Inc., Butler, Pa.; George Holly, Youngstown Sheet & Tube Co., Youngstown, O.; Harry G. Morrow, National Supply Co., Spang Chalfant division, Toledo, O.; Major L. R. Quinn, Enameled Metals Co., Pittsburgh; I. A. Bennett, National Electric Products Corp., Pittsburgh; Jack McAuliffe, Triangle Conduit & Cable Co. Inc., New Brunswick, N. J.; A. E. Newman, General Electric Co., Bridgeport, Conn.; H. S. Walker, Walker Brothers, Conshohocken, Pa.

Sheet Steel Warehouse

Government presiding officer is J. R. Stuart. Committee members: Fred S. Doran, Joseph T. Ryerson & Son Inc., Chicago; J. D. Finnegan, Hynes Steel Products Co., Youngstown, O.; W. H. Franklin, Edgcomb Steel Co., Philadelphia; Sol Friedman, Reliance Steel Corp., Cleveland; Maxwell Jospey, Production Steel Co., Detroit; Newton F. Korhumel, Lapham-Hickey Co., Chicago; Donald C. Lott, Tin Mill Products Corp., Pittsburgh; M. R. Lowenstine, Central Steel & Wire Co., Chicago; W. E. Thoresen, Great Western Steel Co., Chicago.

Electrical Metallic Tubing

Government presiding officer is W. J. Flynn. Committee members: I. A. Bennett, National Electric Products Corp., Pittsburgh; George Holly, Youngstown Sheet & Tube Co., Youngstown, O.; H. R. Coward, Steel & Tubes division, Republic Steel Corp., Cleveland; R. H. Hula, Clayton Mark & Co., Evanston, Ill.; Jack McAuliffe, Triangle Conduit & Cable Co. Inc., New Brunswick, N. J.

Electrical Wholesale Distributor

Government presiding officer is Julian A. Hawks. Committee members: James Barnes, U. S. Electric Supply Co., Springfield, Ill.; D. R. Cohen, president, Glasco Electric Co., St. Louis; F. R. Eiseman, secretary-treasurer, Revere Electric Supply Co., Chicago; D. Lyle Fife, president, Fife Electric Supply Co., Detroit; J. H. Fisher, general manager, Westinghouse Electric Supply Co., New York; J. P. Hamblen, Southern Electric Supply Co., Houston, Tex.; George F. Hessler, vice president, Graybar Electric Co. Inc., New York; W. J. Kranzer, president, Crannell, Nugent & Kranzer, New York; A. C. Prange, manager of sales, General Electric Supply Corp., Bridgeport, Conn.; L. E. Salmon, president, Tennessee Valley Electric Supply Co., Tupelo, Miss.; D. A. Smith, secretary, Graham-Reynolds Electric Co., Los Angeles, Calif.; P. O. West, president, Doubleday-Hill Electric Co., Wash.

Cadmium

Government presiding officer is Harry J. Wolfe. Committee members are: Frank E. Chesney, purchasing department, American Steel & Wire Co., Cleveland; F. F. Colcord, vice president and manager metal sales, U. S. Smelting, Refining & Mining Co., New York; Irwin H. Cornell, vice president & sales manager, St. Joseph Lead Co., New York; C. A. Dinwoodie, MacDermid Inc., Waterbury, Conn.; Clarence Glass, vice president, Anaconda Copper Mining Co., New York; O. J. Hall, vice president, Harshaw Chemical Co., Cleveland; A. E. Mervine, assistant general sales manager, New Jersey Zinc Co., New York; B. H. Jacob, Eagle-Picher Mining & Smelting Co., Joplin, Mo.; C. H. Klaustermeyer, E. I. du Pont de Nemours & Co., Wilmington, Del.; L. K. Lindhal, president, Udylite Corp., Detroit; L. G. Matthews, sales department, American Smelting & Refining Co., New York; Paul M. Savage, secretary, McGean Chemical Co., Cleveland; Dr. R. R. Shively, vice president, B. F. Drakenfeld & Co., New York; Kurt Weinberg, International Minerals & Metals Co., New York; C. W. Yerger, vice president, Hanson-Van Winkle Munning Co., Matawan.

HOW FAST... *To Victory?*

Who knows? But one thing is sure — the thousands of V.T.L.s now in war production will keep whirling until the war is won. Many of them have been working since before Hitler was a corporal — and will still be working when he is a memory. The 60 years of practical engineering experience behind every Bullard Vertical Turret Lathe guarantees the sustained accuracy that modern war — and peace — production demands.

Spiral Drive Vertical Turret Lathes are built in 24", 36", 42" and 54" table sizes. Also Cut Master Vertical Turret Lathes in 74" size with two or three heads.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Vacation for Congress and government by executive branch without interference suggested by Detroit commentator. . . . Bennett and Rausch elevated in revamped Ford organization

IT WAS a hot afternoon at Yankee stadium a couple of summers ago, and the Yankees were having troubles with the White Sox, Lefty "Goofy" Gomez was in the box for the Yanks, the White Sox had the bases full and the score was tied in the ninth inning. Out off second base, 30 feet from the bag, crouched shortstop Tony "Pushemup" Lazzeri, who was the brains of the Yankee infield if not of the entire team. They did not make them any smarter than Tony when it came to baseball.

Gomez wound up and the batter took a cut at the first pitch, knocking a weak grounder back to the box. At the crack of the bat all the runners set sail. Gomez picked up the ball, hesitated a second, then turned and threw to Lazzeri who was still standing between second and third base. The amazed Tony just stood there with the ball while the White Sox runners streaked by and crossed the plate. Then he strolled slowly over to the mound and handed the ball back to Gomez, saying, "wotinell did you throw the ball to me for Goofy?"

Never at a loss for an answer, the great Gomez said, "well, they was all running and you're supposed to be the brains of the team. I thought I'd leave it to you and let you figure it out."

What to do? Half a million coal miners refuse to work. Lewis and Ickes bicker endlessly. The War Labor Board stands haughtily on its rights. Meanwhile coke oven batteries are banked for want of coal. What to do?

Throw the ball to Lazzeri!

Here in the motor city, crazed gangs of hoodlums are joined by thousands of others whose moral fabric has been warped by the excesses of wartime economy and together they roam the city on brutal, terroristic and inexcusable "witch hunts." What to do?

Throw the ball to Lazzeri!

A manufacturer witnesses hundreds of his key workmen, frightened by dire warnings coming from Washington that all fathers under 38 will be drafted by fall, quitting their jobs and scurrying to the security of farm work. Production drops but the orders pile up. What to do?

Throw the ball to Lazzeri! He's the brains of the team.

A machine shop decides to hire some women to replace departing male workers. But there are a number of state laws enacted years ago to protect women against the "cruelty" of industrial labor, so a visit is made to Lansing to see if these laws must be observed to the letter by a plant employing women in the emergency, laws which would require considerable additional expense for rearranging facilities. The state says it is sorry but the laws are on the books and cannot be suspended. What to do?

Throw the ball to Lazzeri!

Holding a "Rubber Line"

Another plant hires a group of women —literally hill-billies off the streets with not even grammar-school education— and puts them at machines where in no time they are earning $60 a week. Meanwhile trained office girls who have gone through high school and business college protest because they are making only $135 a month and cannot be given raises because the WLB says we have to "hold the line" against inflation. The only trouble with this policy, as one observer expressed it, is that the "line" is made of rubber. What to do?

Throw the ball to Lazzeri!

A manufacturer wants to buy a new group of machines to handle a war contract running to, say, a million units. He asks the government whether it will be agreeable to amortize the cost of the machines against the extent of the contract, seeing that there will be no apparent further use for the machines, but the government says, "huh-huh," the machine must be amortized in the usual way over 10 or 15 years. So the manufacturer asks the government to buy the machines under Defense Plant Corp. arrangement, but the government says, "no, that policy has been discontinued." What to do?

Throw the ball to Lazzeri!

That's coming to be the thinking in Detroit today. Thus seasoned, astute editorial commentator W. K. Kelsey in the *Detroit News* writes that "Congress should take a vacation until late September, and give the executive departments an opportunity to function without its interference. Let us have a few months of executive government. Let us see what the executive branch can do under the laws now on the books. Let's leave the organization alone for a time, and give it a chance to function. If we see by autumn that we don't like the way things are going, Congress can then try to find something better. As it is, that body is simply gumming the cards and making play difficult."

Throw the ball to Lazzeri!

New shifts have been made in the executive personnel at Ford Motor Co., following reassumption of the presidency by Henry Ford. First, Harry Bennett, hitherto personnel chief and head of the company's service or plant protection department, has been designated an assistant to C. E. Sorenson, vice president, in matters pertaining to administration,

INSPECT COMBAT EQUIPMENT: E. T. "Barney" Ragsdale, assistant chief engineer of Buick Motor division, H. H. Curtice, general manager, and Lieut. Gen. W. S. Knudsen, former General Motors president, snapped at a Buick proving ground where the latter was inspecting newly developed combat equipment prior to making the commencement address at General Motors Institute, Flint, Mich.

while Ray R. Rausch, who has directed production at the Rouge plant, is named assistant to Mr. Sorenson in matters pertaining to production. Bennett and Rausch are both new directors of the company, and their installation as assistants to Sorenson strikes many as a peculiar shift, although the truth of the matter is that the changes are probably more in the nature of "paper" work than in any actual changes in the duties of the men involved.

Stan Fay, former University of Michigan football luminary, and in recent years assistant to Bennett, apparently inherits Bennett's old job, being "responsible for problems pertaining to personnel" without having any specific title.

Last week it was announced that Mr. Ford was taking over the duties of general manager of the company in addition to the presidency. There has never been any general manager listed in the executive ranks, but the late Edsel Ford in a way filled this position. A new post of assistant general manager has been created and filled by Frank C. Campsall, for 25 years personal secretary to Henry Ford. Part of his new assignment will be to "co-ordinate the work of administrative and manufacturing departments" which in one sense could be taken to mean composing differences between Bennett and Rausch or Bennett and Sorenson should they develop.

Steve Hanagan, hustling New York public relations specialist, who has had the Ford account for some time, has been dismissed by Mr. Ford and this phase of the company's activity consolidated in a news bureau headed by J. W. Thompson, the personnel of which remains about the same as when it was operated by Hanagan.

Two commencements at motor company educational institutes were observed here within recent weeks. One was at Flint, Mich., where General Motors Institute presented diplomas to 130 graduates sent to the institute by 49 plants and divisions of the corporation for training. The other was at Chrysler Institute of Engineering in Detroit where last week 3 graduates received master's degrees in automotive engineering and 115 were awarded certificates in undergraduate courses.

Lieut. Gen. W. S. Knudsen, former GM president and now on a month's vacation from his arduous duties as chief inspector of war plants throughout the nation for the Army, spoke at the Flint exercises. His address was well above par for a Knudsen peroration and concluded with a message which bears repetition: "Live clean, fight hard, think for yourself. This is a great country. In fact, this country has unlimited possibilities, regardless of what is bad in this particular time. This country of ours is free and it is always going to be free. This country of ours is ours and it is always going to be ours, and it is going to be an example for the rest of the world to imitate. Your part in that is great. Go to it, good and strong, and good luck to you."

"This Is Knudsen"

The general looks older and wearier than he did when he used to sit in an office on the top floor of the General Motors building always with his hat on and answering the telephone with a curt, "this is Knudsen." They tell the story of a GM flunkey who heard this answer to a call which had gone astray and replied, "Oh, yeah, and this is Alfred P. Sloan," to which the GM president answered, "I know, but this really is Knudsen."

Frederick C. Crawford, president, Thompson Products and head of the N.A.M., gave the baccalaureate address at the tenth annual edition of the Chrysler institute graduation ceremonies.

Harold E. Long, well-known purchasing official with Nash, who started in the automotive game back in 1917 with C. W. Nash and was until early this year director of purchases for the Nash division of Nash-Kelvinator Corp., has transferred to Kenosha, Wis., as works manager there. This plant builds 2000-horsepower high-altitude Pratt & Whitney aircraft engines.

Among the new developments in rubber, rubber substitutes and plastics unveiled at ceremonies in the new Goodyear experimental laboratories in Akron, O., last week, to which a large section of the press was invited, was one which received a good bit of advance publicity in advertisements and news reports but which the Army scotched at the last minute for some mysterious reason. It involved nothing more than a new means to join wood, plastic or metal parts together and sprang from year-old research conducted jointly by Goodyear, Chrysler and Wright field engineers. The process was described here last fall to 200 aircraft industry representatives but no information was permitted to be released.

TIME SAVER: Seventeen per cent saving in time has been effected at the main aircraft plant of Fisher Body division with adoption of an employe's idea of blowing a piece of string through the conduit with the aid of an air hose, and then pulling the wire through after attaching it to the other end of the string. Former method was to push the wire through the conduits in horizontal stabilizers first, but this often proved troublesome because of the many bends in the conduit

YOUR POSTWAR PLANNING

AND VICKERS HYDROMOTIVE CONTROLS

While postwar plans cannot now be precisely determined, it is clear that one need is for improved products to keep manufacturing at a high level and provide the work necessary to maintain the American standard of living.

After the war, business must be won against stiff competition in practically every field. Present models of many machines will be made obsolete by others with important improvements that cannot be ignored.

The exceptional versatility of Vickers Hydromotive Controls provides unusual opportunities to the machine designer . . . opportunities for far-reaching improvement in the important fields of better control—higher production rates—wider utility—greater safety—elimination of operational difficulties.

Your postwar planning is undoubtedly now underway. Vickers Application Engineers will welcome opportunities to cooperate with you.

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WING TIPS

Employment of women, handicapped men and inauguration of split-shift system help aircraft builders solve manpower problem. Shifts in types of workers pose community, family and plant problems. Health program intensified

WITHIN the past seven months the manpower situation has tightened to such an extent that Lockheed and Vega Aircraft Corps., Burbank, Calif., are concentrating efforts upon adapting their plants to workers who, a year ago, would have been deemed completely unsuitable for factory work, according to recent observations by R. Randall Irwin, director of industrial relations.

More than 60,000 Lockheed and Vega employes were hired during 1939, 1940 and 1941, under a system by which interviewers could go to any city or town in the country and hire men literally by the thousands. All were tested as to mentality, temperament, mechanical aptitude and health, and failure in any one of the four fields was sufficient cause for rejection. Most of these men have melted away. All must be replaced, faster than they disappear, and with a discouraging turnover approximating 60 per cent annually.

This has required abandonment of considerable selectivity, including the geographical, except by establishment of branch assembly plants. The present method of hiring requires that employment needs be proved on a local level to the War Manpower Commission and that all employment interviews be cleared through its facilities in the United States Employment Service setup.

The pre-employment testing program has been scrapped for the duration of the war—the only testing now being done by Lockheed and Vega is of an "aptitude" nature, and only the employe's supervisor believes that he is misplaced on his originally assigned job.

Absorb Migrant Labor Pool

With the migrant labor pool practically eliminated in Southern California, employment requisitions can be filled only by drawing deeper into the reservoir than had been thought possible, and by making factory work as convenient as possible for new classes of labor. Some of the expedients will be valuable in peacetime.

Of first importance is the employment of women, who now represent some 43 per cent of the total employes of both companies. They are doing their work so well that they no longer can be viewed as an "expedient."

The physically handicapped were another surprise field. Surveys having proved that some 250 factory jobs at Lockheed and Vega are open to men and women with a variety of major disabilities, their employment was begun on an experimental basis. The fact that 27 totally blind persons now are doing good work in the two companies is indicative of success, and literally hundreds of physically handicapped people are working as well. Their disabilities range from the lack of both hands, both legs, or both eyes down to migraine headaches, and all are carefully fitted into jobs they are capable of performing well and safely.

High school and junior college boys, 16 and 17 years of age, are proving up. They are employed only through their schools, and are required to maintain scholastic eligibility so that they will graduate with their classes. About 1000 are working at Lockheed and Vega now, with two boys filling one factory job on either of these two plans: Four hours daily in the factory and four in school, with each pair of boys alternating; or four weeks of full-time factory work and then four weeks at school on the same alternating basis, two boys filling one steady job.

A similar plan is now in force, for the

In the shadow of one of the planes they are learning to build, new women workers at Vega take outdoor setting up exercises under direction of Olive Hatch, former swimming champion, to take the kinks out of muscles made sore by unfamiliar use on the assembly line. These and other health exercises are a part of the general induction program which Vega puts all employes through in an effort to discover the proper niche for each new worker

same type of part-time work by adults, either men or women, to work on a split-shift arrangement from 4 to 8 p.m. or from 8:30 p.m. to 12:30 a.m. Business and professional people, and housewives, have shown great interest in the war-work possibilities of this plan.

An interesting and highly successful expedient is the policy of "taking war work to the people." Half a dozen branch subassembly plants have been set up in small Southern California cities, drawing upon the manpower and womanpower with home ties that cannot be broken for a removal to Burbank. Thus new talent is uncovered, and there is no increase in the congestion, housing shortages, and difficulties of the industrial centers.

Long experience, with tens of thousands of women workers has convinced Lockheed and Vega that the major problems of women in industry are carried over from community or family life, or else they are problems which apply almost equally to men, although mitigated somewhat by man's superior strength.

Family Problems Arise

Community and family problems are deeply rooted in the "woman's place in the home," a place which continues to demand a major share of her attention even after she has gone to work in the factory. In this category are the care of the children of all ages up to 16 years; the enormous difficulties of marketing in the face of rationing and shortages; the payment of bills; marital adjustments; and the whole horizon of maintaining a home.

These problems must be faced jointly by the woman, her industry and the community. They are enormously difficult, and they account to a large extent for the fact absenteeism among women is about twice the rate among men. Solutions, in all honesty, rest upon the woman and her community more than upon the industry—the care of children is logically a community problem, at least in a dispersed community such as the Los Angeles metropolitan district, and there is little industry can do with justice to the children, beyond supporting and listing child-care facilities of all classes.

Lockheed now retains 12 women's counselors, and Vega has 15 female staff assistants, whose duty it is to advise and inform women employes on domestic matters, as well as on the strictly industrial problems of women. These industrial problems loomed at first, but they are dwindling with experience.

At Vega, 57 per cent of the workers in productive departments are women as compared with 25 per cent at Lockheed. These women are found in every department, including the final preparation of aircraft for flight. They are group leaders, section leaders, and expert technicians.

At Vega, a 60-year old woman is just completing an experimental tour of duty which has taken her through practically every production job in the plant, except those barred to women by law. She is in perfect health, and a good "learner," and she has found few problems.

A point has been made of necessity of short-cycle operations—repetitive work—for women workers. It is just as true of men, provided the men are as totally inexperienced as the average war-emergency woman worker. Often it is easier to train four women to do the work of one experienced man, by breaking his assembly job in four specialized operations, but once trained, those four women will do four times the work of the man in the factory-wide schedule. The same is true of the inexperienced male musician or broker, for example, who must be trained to replace skilled mechanics.

Sick leaves for women are at least 25 per cent more frequent than among men. Behind this is the fact that noises, vibrations and fumes of a factory are necessarily disturbing to any normal woman until she becomes accustomed to them, and the same is true of work which requires constant crouching or stooping. The personality of the individual woman, plus great care in her job placement when the conditions cannot be corrected, must solve this problem. The age of the woman seems less important in this connection than her physical, mental and emotional soundness.

Consolidated Aircraft Packages Frozen Rivets

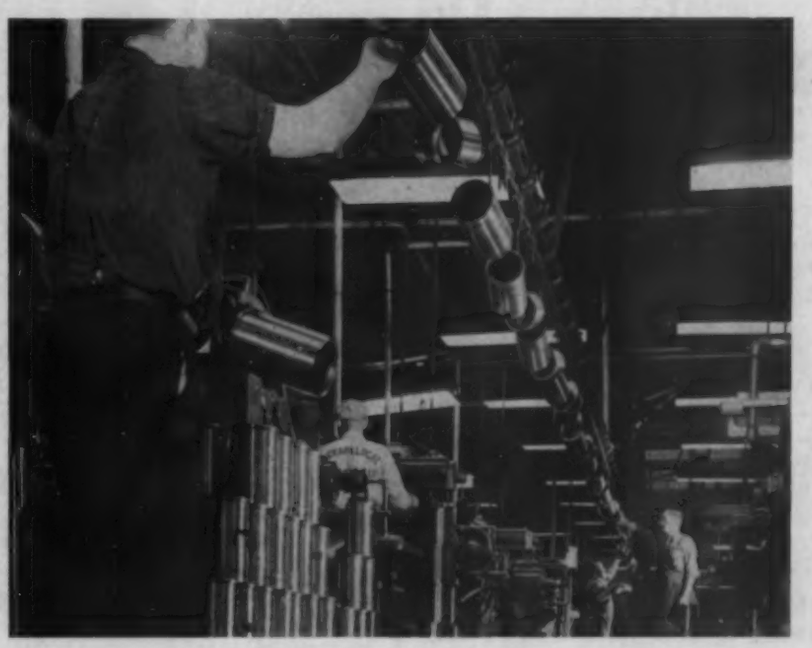
Among unique wartime applications of packaging machinery is that of packaging frozen duralumin rivets in cellophane bags at Consolidated Aircraft Corp., San Diego, Calif.

Purpose of using frozen rivets in assembly of aircraft fuselage and wings is to prevent loosening of parts due to rivet shrinkage when planes encounter extremely low temperatures at high altitudes. Frozen rivets contract, can be driven in smaller holes and hence provide a tight fit at low temperatures.

Purpose of the packaging is to provide a convenient means of handling and delivering small quantities of rivets to the assembly lines.

Lycoming Engine Plant of Aviation Corp. Expanded

Manufacturing facilities of the Lycoming division of Aviation Corp., Williamsport, Pa., have been expanded by the addition of a $500,000 plant, facilities of which will permit Lycoming to increase its growing subcontract work by approximately 30 per cent and in addition will make possible expansion of the production of opposed-type engines in the main Lycoming plant by about 20 per cent. Subcontract machine work in 1943 will be more than double that in 1942.



CONVEYOR SYSTEM: "Know how" automotive production methods speed the flow of Rolls-Royce aircraft engines in the Packard plant. Here several hundred feet of cylinder liners travel on overhead lines through various machining departments

MEN of INDUSTRY

RAY P. WHITMAN

GAIL E. SPAIN

EUGENE B. MAPEL

Ray P. Whitman, first vice president, Bell Aircraft Corp., Buffalo, has also been named manager of the newly formed Niagara Frontier division, Buffalo. Vice president and assistant general manager **Omer L. Woodson** has become vice president and manager of the Georgia division embracing the bomber plant at Marietta, Ga., and **Capt. Harry E. Collins** has been named vice president and assistant manager of the Marietta division. **Charles L. Beard,** secretary and treasurer of Bell Aircraft, has been named administrative assistant to Lawrence D. Bell, president. Mr. Beard will co-ordinate the activities of all the corporation's plants.

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W. A. Yost Jr. has been appointed head of the marine division, steam turbine department, Allis-Chalmers Mfg. Co., Milwaukee.

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K. L. Crickman, manager, Indianapolis branch, Carpenter Steel Co., Reading, Pa., has been appointed regional manager of the Southwestern area with headquarters in Indianapolis. **C. H. Harton** has been named assistant branch manager of the Indianapolis territory.

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D. B. McCoy has been appointed general sales manager, Steel Co. of Canada Ltd., Hamilton, Ont. Mr. McCoy succeeds **George Spence,** who is retiring after serving as sales manager since 1926.

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Frank Parker has been appointed chairman, Iron & Steel Products Inc., Chicago, and **Albert G. Bladholm** has been made president. Others recently appointed are: **John F. Parker,** vice president and treasurer, **William J. Parker,** vice president and secretary, and **Royal J. Casper,** assistant secretary.

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Sherman H. Bowles has been named president and director, Atlas Tack Corp., Fairhaven, Mass., succeeding **Samuel E. Bentley,** resigned.

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Harold E. Long has been appointed works manager in charge of operations, Nash division, Nash-Kelvinator Corp., Kenosha, Wis. Mr. Long succeeds **R. A. De Vlieg** who has been named vice president in charge of all manufacturing operations with headquarters in Detroit.

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Edgar S. Hutton, formerly with Clarke-Harrison Inc., Philadelphia, has been elected treasurer, Chambersburg Engineering Co., Chambersburg, Pa.

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Homer Addams, president, Fitzgibbons Boiler Co., New York, has been elected president and director, Steel Heating Boiler Institute Inc. **F. V. Hebard** has been elected vice president and director, **W. J. Pawer,** secretary-treasurer, and **Montie Heminway,** executive secretary. Other directors elected were: **J. R. Collette, R. B. Dickson, A. E. Jennings, J. F. Johnston, C. N. Tull, J. C. Trafts Jr., A. P. Weiss.**

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Gail E. Spain, vice president, Caterpillar Tractor Co., Peoria, Ill., since May 1942, has been named administrative vice president in charge of advertising, sales, export, engine sales, special products and war contracts departments. Mr. Spain succeeds **D. A. Robison** who has become distributor for the company at Salt Lake City, Utah.

—o—

J. Harold Booth has been appointed vice president in charge of war negotiations, war expediting, subcontracting, employe training, personnel, industrial relations, sales, service and advertising for Bell & Howell Co., Chicago. He has been associated with the company 16 years, his most recent post being vice president in charge of sales and advertising.

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Robert H. Wendt, chief engineer, and **Kenneth W. Tibbits,** production manager, Taylorcraft Aviation Corp., Alliance, O., have been appointed vice presidents of the company.

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Joseph Slepian, associate director, research laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was awarded the Benjamin Garver Lamme medal, given annually by the American Institute of Electrical Engineers.

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R. W. Gemmell has been named manager of the newly formed aviation section, industry engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. **W. A. Mechesney** has been appointed manager, aviation section, under the industrial department. Mr. Gemmell will handle engineering problems connected with the aviation industry, while Mr. Mechesney will supervise commercial problems involving application of Westinghouse products to aviation.

—o—

Eugene B. Mapel has been appointed manager of sales personnel and training, Carnegie-Illinois Steel Corp., Pittsburgh. Formerly assistant chief of the training division of the company, Mr. Mapel has been active in the development of supervisory and employe training programs for the past three years. He is a member of the American Management Association and the American Iron and Steel Institute.

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Edwin B. McConville has been elected treasurer, Skilsaw Inc., Chicago.

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Gordon W. Sabold, formerly field representative, Edward G. Budd Mfg. Co., Philadelphia, has been placed in charge of new Pacific Coast offices opened by the company in Seattle.

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Julian M. Avery has been appointed vice president in charge of research and development, Diamond Alkali Co., Pittsburgh. Mr. Avery had been director of the research and development division at Diamond's plant in Painesville, O., since going with the company in 1941.

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Norman Chandler has been elected a director, Dresser Mfg. Co., Bradford, Pa., and **R. E. Reimer,** secretary-treasurer.

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K. M. Holt has been appointed executive engineer, **A. D. Sommes** assistant engineer, and **F. C. Linn,** designing engineer of the turbine engineering division, General Electric Co., Lynn River Works, West Lynn, Mass. Mr. Holt,

W. P. WOODSIDE

J. A. KRUGLER

CHARLES E. SORENSEN

who has been associated with General Electric since 1908, succeeds **E. D. Dickinson,** who has retired after 43 years service with the company. **T. W. Howard** has been appointed superintendent of turbine and marine installations. General Electric Co., Lynn, Mass., to succeed **J. C. Mahoney,** retired.

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William P. Woodside has resigned as vice president in charge of research, Climax Molybdenum Co., New York. A founder of the American Society for Metals, Mr. Woodside retains his interests in Park Chemical Co., Detroit, and American Twist Drill Co., Detroit, being chairman of the board of both companies. **Alvin J. Herzig,** chief metallurgist, Climax Molybdenum Co., has taken over Mr. Woodside's duties with Climax.

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J. A. Krugler, vice president in charge of sales, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has been named a member of the Frog and Switch Industry Advisory Committee, WPB, Washington.

Henry Ford has assumed duties of general manager, Ford Motor Co., Dearborn, Mich., in addition to the presidency. **Frank Campsall,** secretary to Mr. Ford has been appointed assistant general manager, co-ordinating work of administrative and manufacturing departments, and **Charles E. Sorensen,** vice president, has been named to the board of directors of the Automotive Council for WPB, succeeding **Edsel B. Ford.**

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Paul H. Puffer, former general sales manager, Norge division, Borg-Warner Corp., Detroit, has been appointed to direct postwar planning for Norge appliances.

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Albert A. Bertrand has been appointed superintendent of night operations, Westinghouse Electric & Mfg. Co., East Springfield, Mass.

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Francis C. Frary, director of research, Aluminum Co. of America, Pittsburgh, has been named honorary chairman of the 106th convention of the American Chemical Society, to be held in Pittsburgh, Sept. 6 to 10.

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Lawford H. Fry has been named director of research for the Locomotive Institute, New York.

OBITUARIES . . .

William A. Tryon, 59, president, Thayer Products Inc., Elmira, N. Y., and inventor of the Tryon Shackle automobile bolt, died June 20 in that city.

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Arthur Scott, retired plant superintendent, Cleveland Pneumatic Tool Co., Cleveland, died June 22 in that city. Retiring in 1936, Mr. Scott served the company 40 years.

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George M. Hendee, founder, Hendee Mfg. Co., Springfield, Mass., died recently in Suffield, Conn.

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George H. Kneisler, 57, controller and office manager, Vilter Mfg. Co., Milwaukee, died June 17 in that city.

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Charles Edward Stuart, 61, president, Stuart, James & Cooke Inc., New York, died June 20 in New York.

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William E. O'Reilly, for 42 years New York City representative of Mack Trucks Inc., Long Island City, N. Y., died June 19 in Norwalk, Conn.

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Col. William N. Pelouze, 77, president, Pelouze Mfg. Co., Chicago, died June 20 in Lake Geneva, Wis. Col. Pelouze was a past president of the Illinois Manufacturers Association.

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James Lawrence Bernard, 67, labor relations adviser, Cramp Shipbuilding Co., Philadelphia, former senior mediator, United States Maritime Labor Board, died June 18 in Ventnor, N. J.

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Morris Cooper Jr., 49, member of the board, Cuban-American Manganese Corp., New York, died June 18 in that city.

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Rufus E. Murray Sr., 78, vice president, H. B. Nevins Inc., New York, died June 15 in New Rochelle, N. Y.

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William B. Gillies, 59, vice president in charge of operations, Youngstown Sheet & Tube Co., Youngstown, O., died June 20 in that city. Before joining Youngstown Sheet & Tube Co. in 1923, Mr. Gillies had been associated with Illinois Steel Co., Chicago, Mark Mfg. Co., Chicago, and Steel & Tube Co. of America, Chicago. He was a member of the American Iron and Steel Institute and other organizations.

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John S. Haber, 45, vice president, Philco International Corp., New York, formerly associated with American Steel Export Co., New York, for 21 years, died June 15 in Havana, Cuba.

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Edward T. Fay, 47, vice president, Central Die Casting & Mfg. Co. Inc., Chicago, died June 18 in that city.

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Charles Elliot Perkins, 62, former president, Chicago, Burlington & Quincy railroad, Chicago, died June 19 in Santa Barbara, Calif.

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W. B. GILLIES

Age Creeping Up on Us

The United States this year sheds its youthful role among the nations. . . Population changes and shifts hold important implications for future of business. . . Male majority being whittled away

STEEL of May 3, p. 86, contained a discussion of postwar population shifts as foreseen by Dr. Philip M. Hauser, assistant director, United States Bureau of the Census. Results of this study have proved of great interest to many manufacturers and businessmen who are planning for the postwar period.

To this study have been added findings by Frank R. Wilson, Assistant to the Secretary of Commerce, as set forth at the convention of the Special Libraries Association in New York on June 22.

Sometime this year—regardless of our war casualties—this nation will pass from its traditional role as a "youthful" nation and become one of the so-called "older" nations, says Mr. Wilson.

He cites Census Bureau statistics that show the 2,800,000 male majority which we had in 1910 is being whittled away at the rate of 100,000 a year and we are just now on the threshold of an era in which the female will be in the majority. Despite the fact that nature provides approximately 106 males to each 100 females, the lengthening of the life span of the so-called "weaker" sex, combined with the greater vulnerability of the "stronger" sex to the hazards of life, is about to bring an end to the male dynasty.

The 100,000 females yearly, hereafter, denied the opportunity to marry, will, of necessity, assume a larger part in activities associated with livelihood. This, said Mr. Wilson, holds implications of vast importance to the future of business.

"Efficiency in all types of production," he says, "is increasing so rapidly that each year more than one million workers in our labor force of over 50 millions either find their jobs in peril, or, of necessity, move to a field where their talents find more efficient use. Due to the acceleration of efficiency for war production our labor force by 1946 will have capacity to produce 46 per cent more than in 1940 and unless the postwar era can support a vastly increased volume of production and services, unprecedented unemployment will be inevitable. If our national production in 1946 equals only our production in 1940, 19,000,000 workers will be jobless. A shortening of the work week by 5 hours would still leave 13,000,000 jobless.

"With the accumulated deficit in production for civilian use during the war, combined with the increasing reserve of buying power, nobody expects such a dire thing to happen. Nevertheless, it presents a premise calling for planning.

"Just one example of this prospective backlog: If the postwar era should provide a standard of income that would enable all of our bathless homes to be equipped with bathrooms and acquire the major improvements for which the 1940 Census of Housing showed a need, a market would be provided for more than $15,000,000,000 worth of labor and materials not including the millions of new homes needed by new families.

Birth Rate Will Increase

Another factor that will affect the postwar period, according to Mr. Wilson, is the acceleration in the marriage and birth rate resulting from social, economic and psychological factors generated by the war. Population by July 1 of this year should approach 135,500,000. After a decline in the birth rate of 35 per cent between 1915 and 1933 the rate began to rise slowly in 1934 and in the last three years has reached a point about 25 per cent higher than in 1933. Following an increase in the marriage rate of 23 per cent between 1938 and 1941 the birth rate increased 20 per cent between 1939 and 1942. Those who include the birth rate in their manufacturing and distribution plans will do well to expect a drop in the birth rate following the war; a sharply reduced birth rate always follows a war, says Mr. Wilson.

Other population trends of deep interest to business include the recent rapid growth and industrialization of cities in the South and the process of suburbanization by which in practically all metropolitan districts the population growth has been greater in outlying parts.

Another long-range trend of deep importance respecting our future capacity for employment, says Mr. Wilson, is the continued decline of our agricultural population. In 1940 our agricultural population had declined to approximately 23 per cent of the total and since 1940 the decline has sharpened. Movement away from farms since 1940 has been nearly 3,700,000.

"Declining opportunities for profitable employment on the land, contributing to the concentration of workers in industrial centers, manifestly magnifies the postwar employment problem," says Mr. Wilson.

"Since we have only about 500,000,000 acres of land suitable for crop production, practically all of which is now in use, engaging the services of a declining force of workers, it will not be surprising if economists of the near future are forced to a discussion as to the merits of a land use policy based upon agriculture as a way of life, with many more families on the land, contrasted with agriculture as a large unit production business."

Urges Civilian Goods Plants Be Built Now As Spur To Transition

WAR PRODUCTION BOARD should permit construction of new plants for civilian production now in order to facilitate postwar transition, David C. Prince, vice president, General Electric Co., Schenectady, and chairman, Industrial Advisory Board, Committee for Economic Development, declared in New York last week.

He said that the release of necessary materials should be allowed as "an integral part of the war effort" and disclosed that details on the suggestion and other proposals of the committee were now being prepared for submission to WPB shortly.

Mr. Prince predicted that when the war ends "there aren't going to be any war plants left over—except those which can't be used for anything else." He believed that the release of such facilities for postwar use would be much smaller than expected and that additional productive capacity would have to be added. Much of this will have to be obtained by conversion; nevertheless some new capacity will also probably be required.

"Once individual plans have been formulated, which in total bid fair to provide the productive capacity for the nation's needs, it will be necessary to proceed with the actual steps of preparation for peacetime production," he declared.

The WPB itself might provide the best means for directing the planning and expansion of plant facilities required for the postwar period. The agency, he pointed out, already has complete data on industrial resources for postwar work and such a plan would have the advantage of using an instrumentality already in touch

with all branches of production. The disadvantage, however, is that WPB is a government agency, he noted, adding that "practically speaking, government would be doing the job."

Another alternative, he said, might be that companies previously in civilian production and new companies entering the field would report their present and proposed capacity confidentially to trade association headquarters. Only the sum-total figures would be released, Mr. Prince explained.

Still another alternative, he said, would be for the Department of Commerce to collect figures on existent and prospective capacity, which again would be held confidential, with only total trade figures released. Although also involving government under such a plan, there would be no compulsion on the individual company and the hazard of anti-trust action would be less, he pointed out.

No "Dream" Products Tomorrow

Westinghouse electric appliance division sales chief warns public not to expect fantastic, radical warborn articles immediately upon termination of hostilities. . . Likens postwar crystal gazers to curbstone war strategists

THE AMERICAN public was warned last week not to expect "fantastic, radical, war-born dream products to become actual realities in the immediate postwar period."

Likening postwar "crystal gazers" to curbstone war strategists, T. J. Newcomb, sales manager, Westinghouse Electric Appliance Division, cautioned it will be a year, two years and in some cases five years after the war before "Mrs. Housewife should expect to reap the fruits of proven scientific advance."

He added, however, the assurance that "out of this war will be born many new conceptions of electric appliances."

"I am seriously opposed to creating the impression that radical changes in design or applications of new materials will greet the public in the immediate postwar period," he declared. "More important, I see no crying need for those innovations. The electric appliances as we know them today are certainly good servants."

Mr. Newcomb addressed an audience of newspaper and magazine writers and editors at a meeting in the Waldorf Astoria Hotel, New York, which this year took the place of the company's annual peacetime display of its new line of electric appliances.

Pointing out that the immediate postwar appliances will include minor improvements, Mr. Newcomb said that when the war ends, Westinghouse will get into production fast, "not only to serve a pent-up demand, but equally important, to maintain high employment. To do this means using tools, machines, materials, and 'know-how' that are in existence from pre-war days."

"We at Westinghouse," he went on, "have done a lot of serious thinking about postwar. As a matter of fact we believe it our duty to our employes in the armed services to plan now so that the future they're fighting for can be made reasonably secure. Moreover, we feel we have a duty to the public to be ready to serve them efficiently as soon as some semblance of normalcy returns.

Doing Serious Thinking

"Of course we are discharging our war duties first, but at the same time we are giving some thought to postwar and have arrived at some definite conclusions.

"There is no doubt that out of this war will be born many new conceptions of electric appliances. But, haven't any periods of two, three or four years produced similar results? Of course, development of new manufacturing techniques and new materials has been speeded up by the necessity for improved war tools, and these developments, likewise, will be reflected in electric appliances. Naturally, right now, we are not manufacturing appliances, but to me it is quite probable that we will be long before these new conceptions can be designed, tooled, and tested to a degree that they should be offered to the public.

POSTWAR WOMANPOWER: One of the big problems facing postwar planners is the role women will occupy when victory has been won. Typical of the millions of women employed in war industry is this woman shown bending pipe at the Federal Shipbuilding & Dry Dock Co., United States Steel Corp. subsidiary

Ship Plate Quality

Discussed by British Iron and Steel Institute as factor attending fouling of ship bottoms.

MORE difficulty is encountered in protecting present-day ship plates from fouling than there was with those made a generation ago, Dr. W. H. Hatfield, director, Thos. Firth & John Brown Ltd., stated in a discussion at the seventy-fourth annual meeting of the British Iron and Steel Institute held in London, May 13.

The meeting was presided over by James Henderson, director, United Steel Companies Ltd. and president of the institute.

Dr. Hatfield pointed out that the speed and temperature of paint finishing and other factors are different today from those of a generation ago, and he said it would be interesting to have contributions from those with long experience with the rolling of ship plates covering the past 40 years of production, showing how the nature of the scale and its capacity for adherence to the plate or otherwise might give a clue to the problem.

J. Sinclair Kerr, Lancashire Steel Corp. Ltd., said he thought the purity of the steel made today had something to do with the difficulty mentioned by Dr. Hatfield. He remarked that some Belgian rails which, according to present day standards, British makers would be reluctant to make, stood up amazingly well and it seemed that the degree of purity now reached might have an unfavorable influence.

Electrical Engineers Discuss Postwar Planning

Discussion of technical developments aimed at furthering the war effort keynoted the national technical meeting of the American Institute of Electrical Engineers held in Cleveland, June 21-25. Consideration was also given to more extensive participation in all postwar and civic planning.

Conference attendance numbered about 1500.

The program this year was enlarged to 26 technical sessions, compared with 20 a year ago. Because of wartime restrictions, only two inspection trips were scheduled. These were directly associated with two of the technical conferences.

Nevin E. Funk, vice-president in charge of engineering, Philadelphia Electric Co., Philadelphia, was elected president of the institute for the year beginning Aug. 1. Retiring institute president is Harold S. Osborne of New York, chief engineer of the American Telephone & Telegraph Co.

Other officers elected were: Vice-Presidents W. E. Wickendon, Cleveland; C. W. Rickor, New Orleans; L. A. Bingham, Lincoln, Nebr.; J. M. Gaylord, Los Angeles; and W. J. Gilson, Toronto, Canada.

Newly elected directors were C. M. Laffon, East Pittsburgh, Pa. (reelected); C. W. Mier, Dallas, Tex.; S. H. Mortensen, Milwaukee, W. I. Slichter, New York city, was reelected national treasurer.

Dr. Joseph Slepian, associate director of the Westinghouse Research laboratories, Pittsburgh, together with three other Westinghouse men—C. M. Lear, Dr. Gilbert D. McCann, and Charles F. Wagner—were honored by the A.I.E.E. for outstanding scientific achievement in the field of electrical engineering during the past year.

Cites Essentials of Free Enterprise System

Industry should ask the two major political parties to proclaim whether or not they are for free enterprise if the government does not declare its intentions before the next election, Wilfred Sykes, president, Inland Steel Co., Chicago, said in address last week before the Southern Ohio Postwar Conference of the National Association of Manufacturers.

Mr. Sykes, national vice president and chairman of the postwar committee of the association cited the following five essentials as being characteristic of the system sought:

1) Steady employment of men, materials and money.

2) Pay for owners, management and labor based on performance.

3) Not only more of the accustomed goods, but better goods and goods we have never had before, due to technological advances.

4) Fair prices which will move these goods into a rising standard of living.

5) An opportunity for the American public to profit from that part of their pay which they have saved.

Industry Can Solve Its Problems, Says Crawford

"If we can preserve freedom of speech and freedom of the press, American industry can solve its problems," Frederick C. Crawford, president, National Association of Manufacturers, stated last week in an address delivered before the Wartime Conference of the National Editorial Association in Cincinnati.

Mr. Crawford, who is president of Thompson Products Inc., Cleveland, declared that given freedom of communication, we can freely pool our knowledge and theories and can thresh out differences in debate and work out formulas of conciliation and co-operation.

Mechanical Engineers To Elect Officers for 1944

Nominations for the 1944 officers of the American Society of Mechanical Engineers, which held its semiannual meeting recently in Los Angeles were announced by Benjamin P. Grawes, chairman of the nominating committee who is director of design, Brown & Sharpe Mfg. Co., Providence, R. I.

Election of the nominees will be held by letter ballot of the entire ASME membership of over 16,000, closing Sept. 28, 1943.

Robert M. Gates, president, Air Preheater Corp., New York city, is the nominee for president.

Nominations for vice-presidents are David W. R. Morgan, manager, Condenser Pump & Blower Division, Westinghouse Electric & Mfg. Co., Essington, Pa.; Jonathan A. Noyes, district manager, Sullivan Machinery Co., Dallas, Tex.; Ford L. Wilkinson, Jr., dean of engineering, Speed Scientific School, University of Louisville, Louisville, Ky.; and Rudolph F. Gagg, assistant to the general manager, Wright Aeronautical Corp., Paterson, N. J.

ASTM To Award Dudley Medal at June 30 Meeting

Walter Bonsack, chief metallurgist and director of research laboratories, National Smelting Co., Cleveland, will be awarded the 1943 Dudley Medal of the American Society for Testing Materials for his technical paper titled "Discussion of the Effect of Minor Alloying Elements on Aluminum Casting Alloys" at the society's annual meeting June 30 in Pittsburgh.

Officers nominated by the society, official announcement of election to be given at the annual meeting, follow:

Dean Harvey, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., president; J. R. Townsend, Bell Telephone Laboratories Inc., New York city, vice president; members of the executive committee, T. A. Boyd, General Motors Corp., Detroit; W. H. Finkeldey, Singmaster & Breyer, New York city; E. W. McMullen, Eagle-Picher Lead Co., Joplin, Mo.; E. O. Rhodes, Koppers Co., Pittsburgh, and F. G. Tatnall, Balwin Locomotive Works, Philadelphia.

New Blast Furnace Blown in At Bethlehem's Lackawanna Plant

ANOTHER phase of the steel industry's expansion program was completed on June 18 when the Lackawanna plant of the Bethlehem Steel Co. blew in a new blast furnace, boosting the nation's pig iron production a rated 1200 tons daily.

An appreciable saving in scrap required for the operation of the plant's 30 open hearths is expected as a result of the increased pig iron production. Fuel oil also will be conserved since an increased amount of blast furnace gas will be available as fuel.

New furnace is a duplicate of the "H" furnace, which set a new world's record in October, 1942, by producing 46,246 tons. One tapping notch for iron and two cinder notches for slag are provided in the new furnace. The iron runner has nine spouts and is capable of discharging into eight different ladles, while the two slag runners have three and six spouts.

The modern furnace has a hearth diameter of 27 feet and is 105 feet high with a total volume of 46,706 cubic feet. Installation also includes four stoves for preheating the air, each 122 feet high, and a new turbo blower having a capacity of 100,000 cubic feet of air per minute at 30 pounds per square inch. A new battery of 76 coke ovens, rated at 36,500 tons of coke per month, will also be put into operation within a few weeks.

The hoisting and charging equipment is of latest design with automatic control for maintaining the proper sequence for charging the different materials. The furnace is also equipped with an elevator of 6000 pounds capacity.

Reline Blast Furnace After Operating 7 Years

After almost 7 years of continuous operation with interruptions only for minor repairs, No. 8 blast furnace at the South Chicago plant of the Carnegie-Illinois Steel Corp., United States Steel Corp. subsidiary, has been completely relined for the first time.

One of the largest of the 11 stacks at the plant, the furnace was blown in March 29, 1936. Its output of iron nears the 3,000,000 ton record, a shattering performance in production for the Chicago district of the Carnegie-Illinois Steel Corp. It was shut down for relining on April 7 and resumed operation on June 19.

BRIEFS . . .

Columbia Steel Co., United States Steel Corp. subsidiary, announces that the main office building, which will house some 400 officials and departmental employes at the Geneva steel plant near Provo, Utah, is ready for occupancy.

—o—

National Malleable & Steel Castings Co.'s Indianapolis Works was presented the Army-Navy "E" production award on June 25 in Indianapolis.

—o—

Lindsay & Lindsay, Chicago, has moved its manufacturing facilities to larger quarters at 4825 South Rockwell street, Chicago.

—o—

Meehanite Metal Corp., New Rochelle, N. Y., announces that the John Hastie & Co. Ltd., Greenock, England, is now manufacturing Meehanite Castings.

—o—

Yancey Co., Sacramento, Calif., has been awarded a second contract for ship sections by Kaiser Cargo Inc., Joel H. Yancey, president, announces.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces appointment of W. S. Edsall as manager of a newly combined switchgear and control division.

—o—

Phelps Dodge Copper Products Corp., with mills in New Jersey, New York, Indiana, and California, plans to engage in manufacture of aluminum and magnesium tubes, rods and shaped parts, produced by the extrusion process.

—o—

Western Electric Co., operating several overflow plants in various locations at Chicago recently acquired another operation on North Kolmar avenue.

—o—

Sylvania Electric Products Inc., Salem, Mass., has established distribution facilities in Chicago through lease of building providing about 50,000 square feet at 1428 West Thirty-seventh street.

—o—

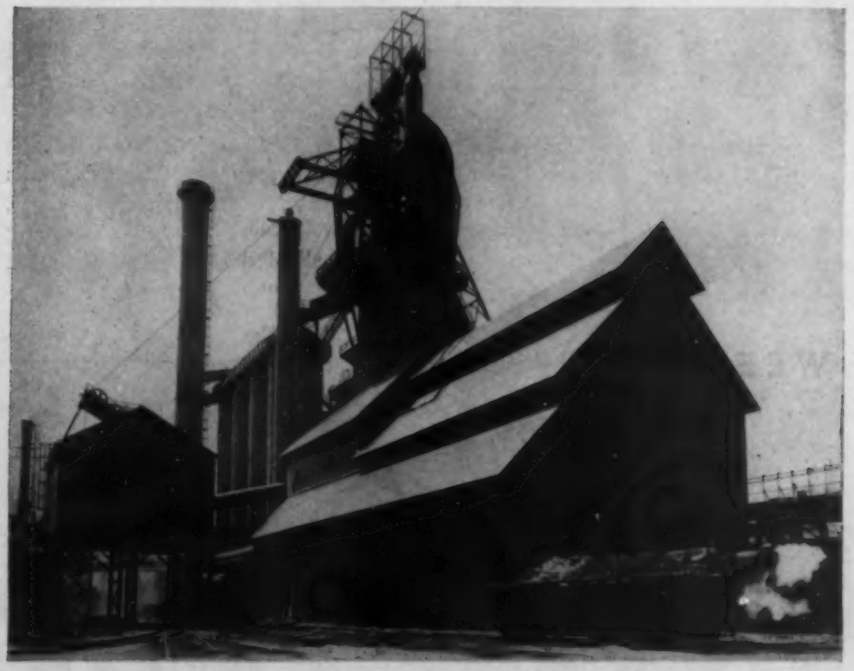
Cline Electric Mfg. Co., formerly located on West Pershing road, Chicago, has leased a four-story building with 48,000 square feet at 4550 West Lexington street.

—o—

Stanley Knight Corp., 3430 North Pulaski road, Chicago, manufacturer of soda fountains, dry ice converters, and dispensing equipment, recently purchased plant property which it has occupied the past eight years.

—o—

S. Heller Elevator Co., Milwaukee, Wis., is celebrating its fiftieth anniversary. Siegfried Heller, president and founder of the company, died in 1924.



This new blast furnace with a rated daily capacity of 1200 tons of pig iron was blown in June 18 at the Lackawanna plant of the Bethlehem Steel Co. Design embodies automatic control for maintaining the proper sequence in charging the different materials

THE BUSINESS TREND

War Production Holds In Face of Setbacks

SPURRED by upward revisions in requirements for many of their products going into the war, metalworking and other basic industries sustained production throughout the latest week at a relatively high level.

Unusual efforts to take up the slack from the previous week's decrease in coal and steel output were matched by the higher tempo of production in many war goods plants which have completed rescheduling to meet altered demands of the armed services.

STEEL—Recent coal mine shutdowns have materially reduced coal inventories of steel producers, resulting in sharp fluctuations in the national steelmaking rate. Decline to 96½ per cent of capacity during the week ended June 12, attributable to the early June coal strike, was followed by a 2-point rise to 98½ per cent in the ensuing week.

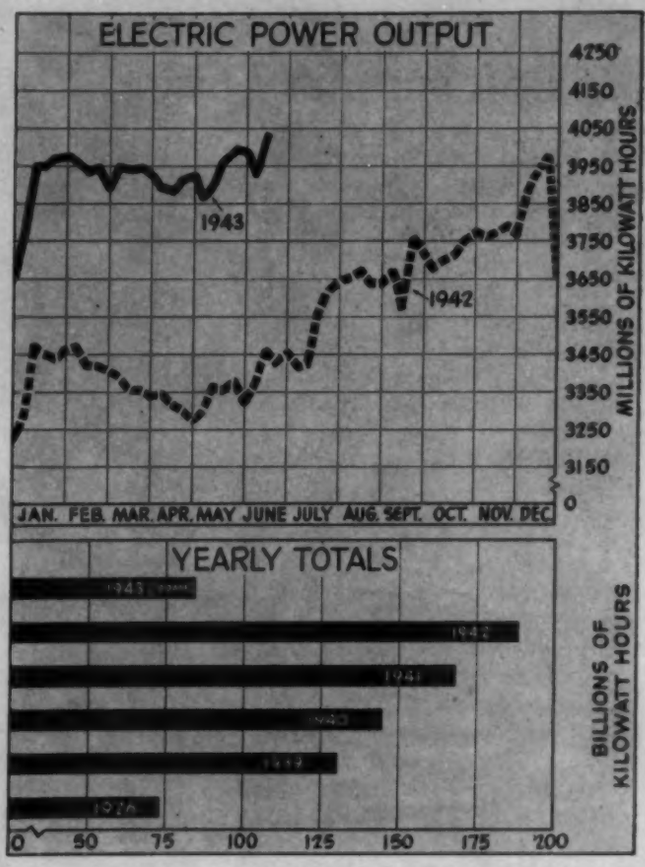
CARLOADINGS—Loadings of revenue freight for the week ended June 12 totaled 854,486 cars. This was an increase above the corresponding week of 1942 of 21,851 cars and a 28 per cent increase above the preceding week when loadings fell to 667,575 units. In the later period coal loadings gained 129,236 cars, the aggregate number for the week being 170,513. Ore loading amounted to 87,347 cars, up 12,692 units, while coke loading totaled 13,794, an increase of 2374 cars.

BUILDING—Indicating the approach of the final phase of major war construction on a diminished scale, heavy engineering contracts were valued at less than 30 per cent of the total a year ago. Awards amounted to $44.2 million, compared with $69.6 million in preceding week and $63.9 million one month ago.

POWER—A new all-time peak in energy distributed by the electric light and power industry was established last week as the total output climbed to 4,098,401,000 kilowatt hours. The Edison Electric Institute points out this is an increase of 19.4 per cent over power use for the week ended June 20 last year, 3,433,711,000 kilowatts.

Vast increase in demand for electric power induced by the expansion of old facilities and construction of new plants for production of munitions has necessitated corresponding expansion in generating equipment. The story of this development in terms of that industry's output is illustrated in the accompanying chart. Heavy expenditures for new generating units during the four years from 1939 through 1942 are first reflected in aggregate output for 1939, which was practically double the 1926 average of 73.6 billion kilowatt hours. In 1940 the upcurve topped 144.9 billion kilowatts, increasing another 23 billion in 1941 and 20 billion additional units last year.

Seasonal influences appear to have had less effect on production of electric power through the first four months of 1943 than in previous years. The monthly average, 17,203,900,000 kilowatt hours, is substantially above any preceding year and while a slight decrease is anticipated for May, new records may be set in later months.



FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	98.5	96.5	99.0	99.0
Electric Power Distributed (million kilowatt hours)	4,098	4,040	3,992	3,434
Bituminous Coal Production (daily av.-1000 tons)†	1,984	508	2,025	1,888
Petroleum Production (daily av.—1000 bbls.)	3,991	3,988	4,006	3,721
Construction Volume (ENR—unit $1,000,000)	44.2	69.6	63.9	155.7
Automobile and Truck Output (Ward's, number)	19,080	19,065	19,175	23,225

*Dates on request. †Lag of one week.

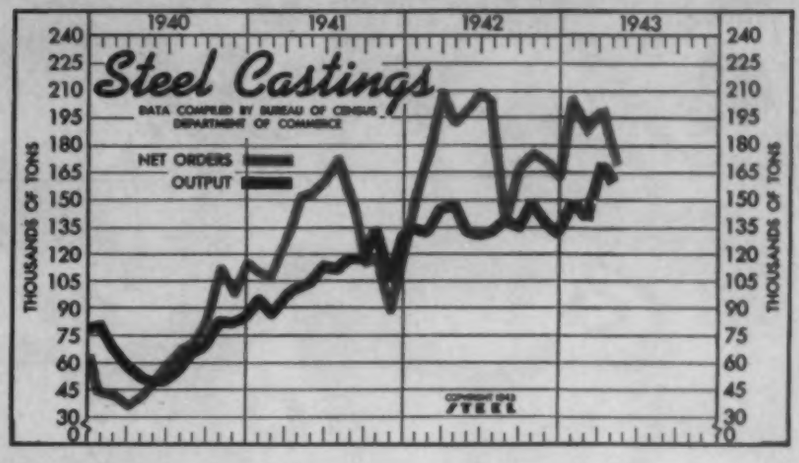
TRADE				
Freight Car Loadings (unit—1000 cars)†	880	855	843	845
Business Failures (Dun & Bradstreet, number)	78	54	47	180
Money in Circulation (in millions of dollars)	$17,189	$17,237	$16,674	$12,208
Retail Sales (change from like week year ago)	+17%	+15%	+7%	+12%

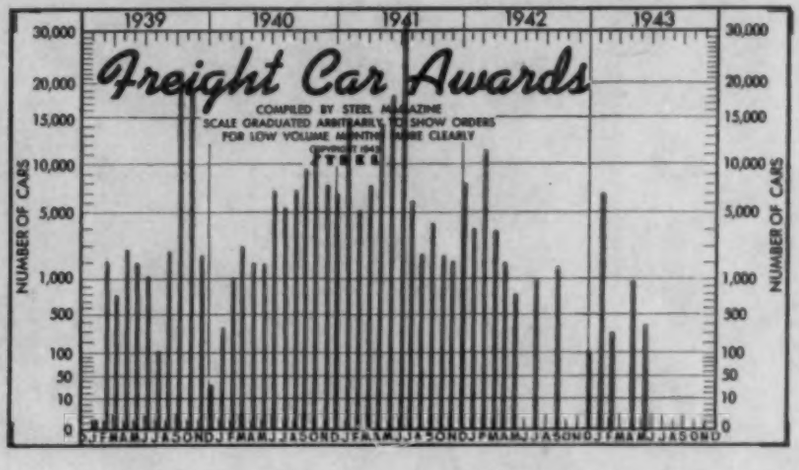
††Six months.

Commercial Steel Castings

(Net tons in thousands)

	Orders		Production	
	1943	1942	1943	1942
Jan.	210.2	150.5	151.6	134.8
Feb.	188.4	179.9	148.7	133.7
Mar.	198.7	211.1	172.8	146.5
Apr.	165.1	191.2	160.8	149.6
May	.....	199.6	.....	131.5
June	.....	208.9	.....	132.0
July	.....	202.5	.....	135.7
Aug.	.....	141.2	.....	139.2
Sept.	.....	177.5	.....	139.8
Oct.	.....	179.5	.....	152.1
Nov.	.....	173.3	.....	140.4
Dec.	.....	172.3	.....	143.9
Total	.....	2,187.3	.....	1,679.2





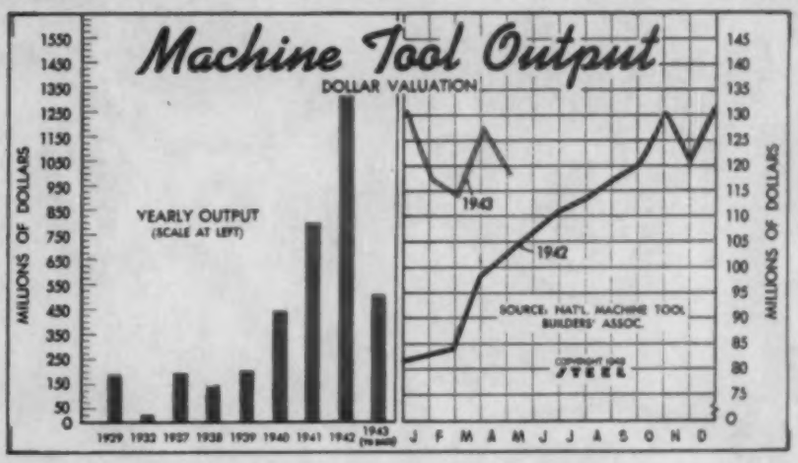
Freight Car Awards

	1943	1942	1941	1940
Jan.	7,415	4,253	15,169	360
Feb.	350	11,725	5,508	1,147
Mar.	0	4,080	8,074	3,104
Apr.	1,000	2,125	14,645	2,077
May	370	822	18,630	2,010
June	.....	0	32,749	7,475
July	.....	1,025	6,459	5,846
Aug.	.....	0	2,668	7,525
Sept.	.....	1,863	4,470	9,735
Oct.	.....	0	2,499	12,195
Nov.	.....	0	2,222	8,234
Dec.	.....	135	8,406	7,181
Total	.....	26,028	121,499	66,889

Machine Tool Output

(000 omitted)

	1943	1942	1941
Jan.	$117,384	$83,547	$50,700
Feb.	114,593	84,432	54,000
Mar.	125,445	98,358	57,400
Apr.	118,031	103,364	60,300
May	.....	107,297	60,800
June	.....	111,090	69,070
July	.....	113,596	63,019
Aug.	.....	117,342	70,069
Sept.	.....	119,883	74,906
Oct.	.....	130,008	84,178
Nov.	.....	120,871	81,320
Dec.	.....	131,960	81,435
Year			
1942			1,321,862
1941			812,462
1940			450,000
1939			210,000



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet, total in billions)	$8,594	$8,123	$9,117	$7,187
Federal Gross Debt (in billions of dollars)	140.9	140.4	138.7	74.9
Bond Volume, NYSE (millions of dollars)	52.4	53.2	62.3	27.5
Stock Sales, NYSE (thousands of shares)	4,966	5,263	5,926	1,704
Loans and Investments (in millions)†	$46,808	$47,182	$47,289	$31,736
United States Gov't. Obligations Held†	32,249	32,467	31,965	15,343

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)††	243.8	245.3	245.8	229.1
Industrial Raw Materials (Bureau of Labor index)†	114.8	114.1	113.7	99.6
Manufactured Products (Bureau of Labor index)†	100.7	100.9	100.9	98.8

†† 1931 = 100. † 1926 = 100.

INDUSTRIAL "KNOW-HOW"

...wins battles on production front

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New Style Replaceable Section Arbor

4

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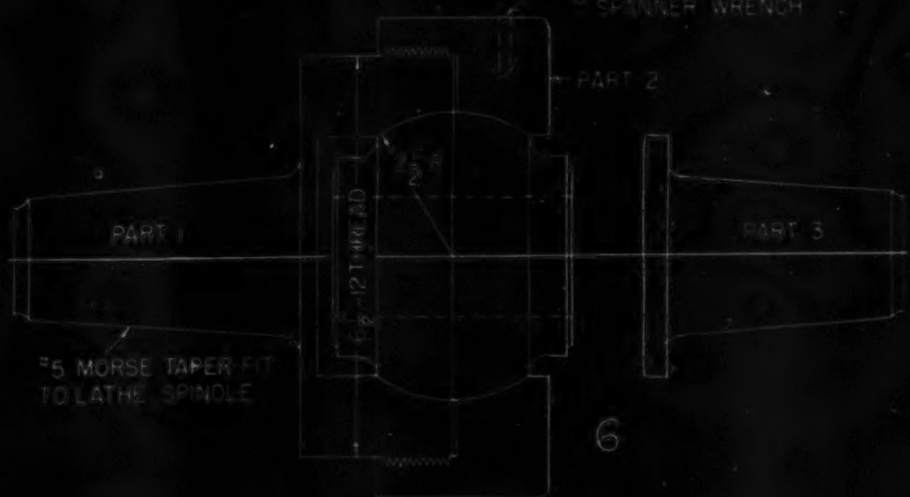

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EMPLOYES of the General Electric Co. are helping to win the battle of production through the development of short-cuts which are resulting in the saving of both time and materials.

These refinements in production technique or industrial "know how" originate from individual workmen through the company's suggestion box system with cash awards, from methods men, plant engineers, tool designers, foremen and others in supervisory capacities.

Nesting: In view of the fact that reports from Washington indicate scarcities of materials will continue for many months, a method for obtaining more parts cut from flat sections of metals will be of interest to many readers. General Electric makes thousands of such small parts for small motors, turbines, electrical apparatus and the like from flat sheets. Some are in the form of simple circles and triangles but others are in complicated shapes such as stars, top-hats and banjos.

The problem, of course, involves obtaining the greatest number of parts from the smallest amount of material. The best possible nesting arrangements for squares, triangles and circles can be worked out through simple formulas but complicated parts present a more difficult problem. In the latter case, parts are drawn to scale on paper, cut out and then shifted around until they fit snugly within the proportionate size of a stock sheet of metal. Often parts for more than one product are placed in the same layout to obtain closer nesting. Whenever it appears that a slight change in length, width or thickness of a part will permit cutting a larger number from the same sheet, design engineers are consulted to see whether a change is possible.

Fig. 10 shows percentage savings of material possible through re-arrangement. As one example, a small T-shaped part formerly was stamped from strip on a punch press leaving a considerable area of scrap material. It was found by using slightly wider material and a double die, two T's could be stamped out at the same time with a very substantial saving in material.

Magnetic Base Drill: For speeding up the drilling and tapping of holes in waterwheel generator frames, a portable drill, Fig. 8, with an electromagnetic base was constructed. It consists of a railbonding drill frame altered to make a reversible multivane. A third leg was welded to the frame to provide added stability. The drill is fitted with a quick-change chuck to speed the change-over from drill to tap since once the equipment is positioned, the hole is drilled and tapped without disturbing the set-up. The drill is ratchet fed.

The electromagnet, having a force of about 500 pounds on material with a minimum thickness of 3/16-inch, serves as the base of the equipment. It operates on 1230 volts, being energized and de-energized by means of a toggle switch located on the frame. A foot treadle is used to lower the magnet to the work and raise it for repositioning. When the magnet is raised, the equipment may be easily moved on three balled casters. A solenoid-operated air valve between the air source and the drill keeps it inoperative unless the magnet is energized.

Of course, the best type of application for this device is in drilling heavy plate or other flat surfaces of fairly large area. Where the surface is curved or otherwise irregular, or on narrow rails, shafts and the like, its application may be limited.

Reaming Holes: A fast spiral reamer, Fig. 6, is especially useful in making straight holes with the axis of the hole held within 0.0001-inch in 4 inches. Accuracy holds up remarkably well even though the hole being reamed encounters other holes or cavities. Edges hold up well and sharpening is not difficult. The left-hand spiral flutes are shaped like a buttress thread. One, two and three-flute reamers have been used. Diamond cut is obtained by cutting overlapping right hand and left hand spirals as shown in Fig. 6.

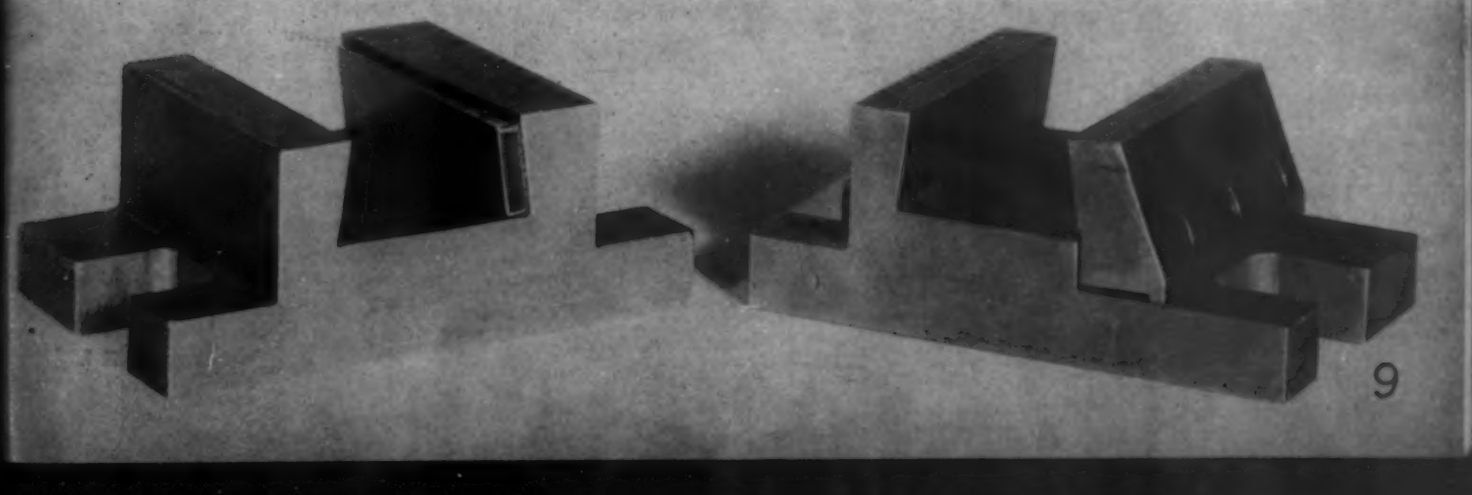
The lands are interrupted by a right-hand triple-spiral flute with 1½ threads per inch. These lands are unrelieved and may be up to 0.012-inch wide. Radial face of the left-hand spiral flutes is toward the starting end of the reamer and is ground with a 5-degree positive

rake. Only ¼-inch of the length of the reamer is straight and of the required size. The next 2-inch portion is tapered 0.0017-inch smaller toward the starting end and the next ¾-inch is tapered 0.0003-inch smaller in the same direction.

Both the straight and tapered portions of the reamer are cylindrically ground. The fluted shank, which serves as a back pilot, is cylindrically ground 0.0005-inch smaller than the finished diameter of the reamer teeth. For a reamer ½-inch in diameter, a left-hand thread of six threads per inch and a triple right-hand thread of 1½ threads per inch seems to be satisfactory.

Preventing Solder Spatter: Fig. 2 shows a simple but effective sleeve devised to prevent molten solder from spattering on the operator or adhering to

(Please turn to Page 110)



An analysis of the Lundbye process, procedure and equipment that produces . . . .

300% Increase in Tool Life

(Concluded from June 14)

EXPLANATION of the highly satisfactory results obtained by tests of the process described in the first section of this article June 14 appears to lie in the characteristics of the chromium plate itself. *Metals Handbook*, 1939 edition, p. 1102, in discussing ordinary industrial or "hard" chromium plating reads, "The plate is extremely brittle and should not be employed for tools subjected to shock."

HOW COATING DIFFERS: Outstanding difference between conventional "hard" chromium plating referred to above and that produced by the Lundbye process perhaps is the difference in character of the coating. The effectiveness of coatings obtained by the new process is undoubtedly due to two things:

First, it is not brittle, there being no tendency for the coating to spall or chip, according to reports from users. Second, the coating is securely anchored to the base metal—it cannot be peeled off. Explanation of how these advantages are obtained will be given below —but for the moment let's examine the reasons why a properly processed chromium plate should be of value in extending the life of cutting tools and in similar applications:

Hardness: The outstanding reason why chromium surfaces resist wear is the extreme hardness of electrodeposited chromium. It has been stated that its hardness ranges from 400 to 1200 brinell. Certainly it is well up into the higher

Fig. 1. (Upper left)—Original outfit which processed hundreds of tools satisfactorily. Total cost was less than $50. Tanks and controls above bench, motor-generator and lamp bank below

Fig. 2—(Lower left)—Easily removed insulating paint is applied to prevent deposition of chromium to noncritical surfaces. Only cutting edges and their supporting surfaces need be plated

By G.W. Birdsall

Engineering Editor, STEEL

In first part of this article June 14, the results of hundreds of individual user tests were analyzed and possibilities of the process examined. Here the characteristics of the thin chromium coating and means of anchoring it to the base metal are discussed; procedure and equipment described

range. Axel E. Lundbye, chief engineer, Crowell-Collier Publishing Co. says ". . . if plated correctly, it should never be below 900 brinell".

Wear Resistance: Such extreme hardness should provide a surface with great resistance to wear. This no doubt accounts for some of the excellent performance recorded for correctly plated tools, also for the ability of cams and gears so finished to show greatly decreased wear.

Low Friction: The low coefficient of friction of chromium plate should also be advantageous for it minimizes metal-to-metal contact. The result is that chromium surfaces appear "slippery, greasy and nonwetting". Obviously, this also acts to reduce wear on edges of cutting tools, cams, gears and the like.

Corrosion Resistance: Also of importance on certain applications is the chemical resistance of chromium plate. Such surfaces are not affected by most organic chemicals, alkalies, or sulphur or sulphur compounds, according to *Metals Handbook*, p. 1102. Nitric acid does not dissolve this plate but it is attacked readily by hydrochloric acid and slowly by sulphuric acid. However, chromium plate does not tarnish nor corrode in ordinary atmospheres. It remains bright at temperatures up to about 900 degrees Fahr. Obviously the corrosion resistance also depends directly upon the thickness of the plate and its porosity.

Expansion: The coefficient of expansion of chromium is less than that of most metals. The result is a tendency for plated coatings to flake off when the metal becomes heated sufficiently. That, perhaps, is one of the reasons for the unsatisfactory performance of cutting tools when chromium plated by conventional methods. It indicates that a thin perfectly bonded plate is required if good results are to be obtained because such a coating tends to follow the movement of the underlying metal more readily.

Toughness: Now we are approaching the reason for the failure of ordinary chromium plate on cutting tools, dies, punches and other heavily loaded areas or points subjected to impact. In reference to conventional "hard" chromium, *Metals Handbook* reports (as previously mentioned), "The plate (chromium) is extremely brittle and should not be employed for tools subject to shock. The toughness can be somewhat increased without depreciating wear resistance by heating to temperatures under 500 degrees Fahr." Yet most attempts to date to increase toughness of the chromium plate have met with few tangible results as many who have tried it well know.

Consider the following from a report on a test of the Lundbye process by a large manufacturer (name on request, 21).

"Of the five sample *punches* processed . . . . one ran 33,000 pieces. Very few punches plated in our plant run 25,000. The average production per punch is 8000, while an unplated punch will run 4000 to 5000 . . . .

"From observing the punches in operation, we have come to the conclusion that the increased production was due to the fact that when the chromium plate wore through to the steel, it did not strip off of the steel but the punch continued to operate until it was undersize. When our (conventional) chromium plate wears through in one place, the remaining chromium immediately strips from the steel and causes galling. This tends to indicate that your process (Lundbye) is giving us *a much better bond between steel and chromium* than is our process."

CHARACTERISTICS: Now our anlysis of the evidence presented has proceeded to a point where we can determine the factors that apparently contain the key to the success of the Lundbye process. From reports examined here and in the first section of this article June 14, the plate differs from conventional chromium plate in that it is not brittle; exhibits no tendency to chip, spall or peel from the base metal; withstands expansion strains due to operation of high-speed steel cutters at high temperatures.

These reports indicate the process develops not only an extremely tight bond between plate and base metal but also produces a plate that is not brittle.

HOW IS IT DONE? To find out how it is done, let's examine some of the differences between the process and conventional chromium plating. As will be pointed out, the key appears to lie not only in the extremely thin coating applied but also in the heat treatment that follows the plating operation.

Sharpen Edge: Regardless of the type of cutting tool, the edge is completely sharpened before plating. No finishing is done after plating for the exact surface of the work is reproduced to all intents and purposes. First the tool to be plated is ground to the shape desired. Next the cutting edge and adjacent areas are finished by working with a fine stone. This helps clean the steel surfaces. Dirt, grease and oil should be removed thoroughly, for the surface must be chemically clean—a requirement of all chromium plating work.

Acid Etch: Any oxide or tarnish remaining is removed by a dip into a 10 per cent hydrochloric acid solution for 30 seconds, followed by thorough rinsing in water.

Electrolytic Clean: These precautions are supplemented further by an electrolytic cleaning cycle which may be accomplished either with current reversed —work as anode—in the regular plating bath or in a separate tank. The purpose of this careful cleaning is to not only assure a chemically clean surface but also to etch the work slightly in order to produce minute depressions and pits into which the coating can key itself. The chemically clean surface helps bond the electroplate to the base metal, and the slight etching affords a means of anchoring the electroplate mechanically.

The electrolytic cleaning cycle utilizes the same current density as plating—200 to 500 amperes per square foot (1.5 to 3.5 amperes per square inch)—applied for a period of approximately 2 seconds. As was mentioned in part one June 14, electrolytic cleaning cannot be used satisfactorily when carbon content of the steel being treated is above 0.70 per cent. Below 0.60 per cent, no difficulty at all is experienced, and occasionally none up to 0.70 per cent. Above that figure, however, the carbon is almost sure to produce a black scum on the surface of the work that will prevent proper adherence of the plate. On high carbon steels and other metals, careful chemical cleaning replaces the electrolytic cycle.

If electrolytic cleaning is done in the plating tank, it is merely necessary to reverse the current for the selected period.

PLATING: *The plating process is not* critical, reports Mr. Lundbye. The anode is preferably lead, although stainless steel can be used. Area of anode should be slightly less than that of the cathode or work. The

plating bath is made up by dissolving 33 ounces of chromium trioxide (99¾ per cent) in a half gallon of water and adding 0.01 this amount of concentrated sulphuric acid (0.33-ounce). Then water is added to make a total of 128 ounces or 1 U. S. gallon. The bath is made up in this proportion according to the requirements of the tank. Other concentrations of chromic acid have been tried, including 45 and also 55 ounces per gallon. As far as can be determined, there is no difference in the results.

The tool to be plated is used as the cathode. The cutting edge of the tool is immersed ¼-inch below the surface of the solution so only that portion is plated. It of course is not necessary to plate the entire tool. Various chemical stop-off preparations are available to confine the plating to the areas desired in event the work is large or of awkward shape. See Fig. 2.

Current Density: From 200 to 500 amperes per square foot (1.5 to 3.5 amperes per square inch) are used in plating depending upon the material and shape of the work. Sufficient current is employed to get a steady evolution of gas —without surges—extending out from the work in all directions for from 1/16 to 1½ inches. This range in gassing distance indicates that the distance is not critical. This requirement of proper "gassing" provides the minimum limits for the work. Higher currents can be and are used to shorten plating time. Of course conditions of bath composition, temperature and current density must be co-ordinated properly.

Potential at the plating tank ranges from 3.5 to 5 volts and will average 4 volts. The bath is operated at a temperature of 140 degrees Fahr.

At first, a "flash" plating cycle was thought necessary but now has been eliminated.

THICKNESS: This really should be labeled "thin-ness" for the plate is extremely thin, in fact this is one of the points that makes the coating produced by this process different from conventional "hard" chromium plates, which usually range from 0.0001 to 0.0400-inch or more in thickness. The plate by the Lundbye process is generally much less than 0.0001-inch. The current density ranges used are designed to produce a plate that is 0.0010-inch thick after an hour's plating in the bath. But most parts are plated only from ¾ to 1 minute. Thus the plate must be something considerably less than 0.00005-inch in thickness.

When plated coatings are so extremely thin, it is quite difficult to measure them accurately. This makes it a tough proposition when one tries to determine the thickness for optimum results as will be discussed later.

After the tool has been plated, it is rinsed in water and dried. The surfaces plated should present a semi-lustrous blue-white appearance. The coating should be distributed evenly over the entire cutting edge and adjacent areas. If there is any bead or excessive build-up on the cutting edge, the entire coating must be stripped and the tool replated. Stripping can be done in a solution of equal parts by volume of hydrochloric acid and water. This will etch the steel only slightly if the work is removed from the bath as soon as the chromium is dissolved.

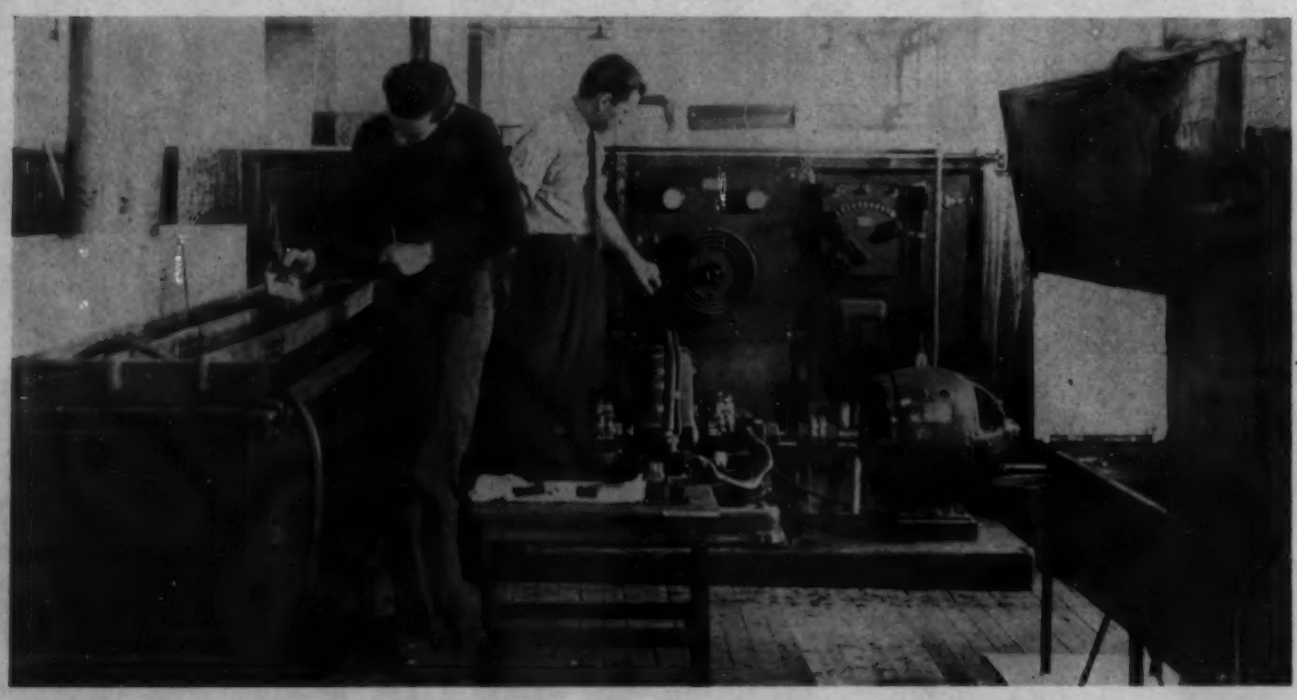
If the trouble recurs, it may be necessary to go to some form of deposition control such as that described in STEEL, April 26, 1943, p. 86, where control methods for application of uniform chromium plate to gages are detailed.

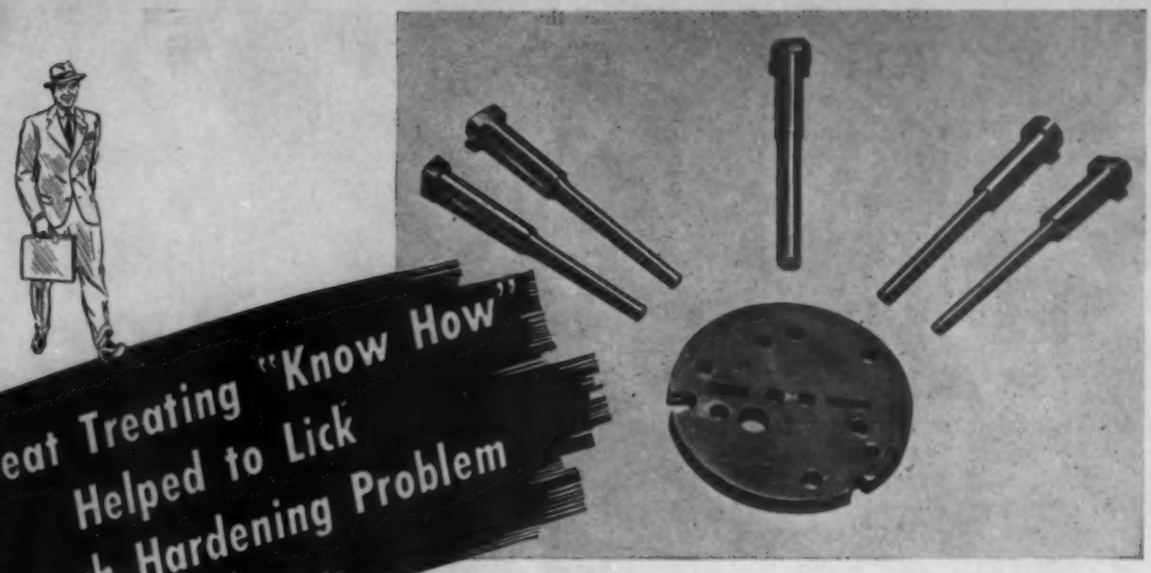
HEAT TREATMENT: A most vital part of the process is the heat treat, for it is this that decreases the brittleness of the deposit and improves the bond, Mr. Lundbye points out. Yet the heat treatment is most simple, the work merely being immersed in an oil bath for an hour while the bath temperature is maintained at 350 degrees Fahr. Then the work is removed, allowed to cool in air, is rinsed and dried. *This part of the process is considered to hold the key to the success of the plate produced.*

WHY NOT BRITTLE? Let's find out why the heat treatment apparently decreases the brittleness of the deposit. Many authorities believe that electrodeposited chromium is really a solid solution "alloy" of chromium and hydrogen. A tremendous volume of hydrogen is liberated at the work surfaces during the plating operation and a considerable amount is believed to be included in the deposited chromium. This is the cause of the brittleness, commonly referred to as "hydrogen embrittlement".

But by heating the work in the oil bath for a considerable period, an opportunity is afforded for the hydrogen to "ooze" out of the plate since the deposit is more or less porous and ex-

Fig. 3—Large production setup installed to process sample tools and parts for war plants includes 800/400-ampere generator set, large tank for plating and electrolytic cleaning at left, oil tank at extreme right





How Heat Treating "Know How" Helped to Lick a Tough Hardening Problem

Here is an on-the-job story of how Carpenter tool steel and the practical knowledge of a Carpenter representative teamed up to solve a tough tool steel problem. The facts are summarized below. The tools and work involved are shown in the photograph.

THE JOB:

Punching ¾ hard brass (Rockwell B-79), .137" and .150" thick, in a double acting 250-ton punch press. The holes to be punched vary from .099" to .167".

PROBLEM:

Preventing cracking of punches under the head during hardening, avoiding decarburization and keeping the punches straight in quenching. About 75% of the punches hardened had been cracking in the shoulder under the head in the hardening process.

SOLUTION:

The Carpenter representative, when asked for advice, made the following suggestions: First, to use the recommended furnace atmosphere of 2% to 4% oxygen. Second, to switch from a tap water quench to one of 10% brine. Third, to heat the punches in a piece of ¾" round iron pipe (both ends open)—so that the punches can be dropped vertically into the brine to get a full quench under the head.

RESULT:

On the first try following these recommendations, some 200 punches made from Carpenter Green Label Drill Rod were hardened, using a temperature of 1450° F. with an atmosphere of 2% to 4% Oxygen. The problem was licked! Decarburization was eliminated and all were O.K. for straightness. In production they averaged 100,000 holes per punch.

• If *you* have a tool steel problem—or if you should like help in getting tools that give longer uninterrupted production runs—your nearby Carpenter representative will be glad to give you every assistance. He can supply you with helpful printed matter—he can render personal "on the spot" service—and he will keep you in touch with the Carpenter Metallurgical Department.

THE CARPENTER STEEL COMPANY
139 Bern St., Reading, Pennsylvania

Carpenter
MATCHED
TOOL STEELS

tremely thin. Whether the hydrogen is actually released from the deposited metal, absorbed by the base metal, or changed into some other form that is noninjurious is not known. Additional investigation will have to determine that.

In the meantime, *it is known* that the effect is to eliminate the undesirable characteristics the presence of hydrogen normally produces.

WHY A BETTER BOND? As mentioned in part one June 14, one of the unsatisfactory characteristics of conventional "hard" chromium plates is that the bond with the base metal often appears poor, resulting in a tendency for the plate to chip, spall or peel from the base metal readily. Such coatings are unsatisfactory for cutting tools, gears, cams, punches, dies and like applications where heavy loadings may be combined with impact. (Refer back to *Metals Handbook* statement, page 85.) When in addition they must operate at high temperatures, they are almost worthless.

Why should the oil treatment improve the bond in the process? Mr. Lundbye suggests that perhaps the following explains it: At start of the plating cycle, there is a race between the hydrogen and the chromium ions to reach the minute depressions etched into the surface. In a certain percentage of cases, the hydrogen ion wins. This means that hydrogen will be found in a goodly number of these depressions under the surface of the coating when the plate is finished.

When placed in service on a cutting tool, for example, or any other application where severe unit loadings and elevated temperatures may be present, the hydrogen may "explode", acting as so many small bombs. The result is to "blast" the overlaying chromium from the base metal . . . in other words, the presence of the hydrogen may be the cause of the apparently poor bond. Imperfect cleansing of the surfaces to be plated can also cause a poor bond, but we are considering that this phase of the plating process has been handled correctly in both cases and so would not show up in any comparison of results obtained between conventional methods and the Lundbye process.

The oil treatment, by dissipating or "neutralizing" the hydrogen, ends the possibility of it causing the chromium plate to separate from the base metal, thus giving the effect of a greatly improved bond between the plate and the base metal. Of course, the slight etch given the work before plating also helps increase the bond by providing points which mechanically key the coating to the base metal. But since this etch is also employed in chromium plating processes that are not so satisfactory, this cannot be considered a significant part of the Lundbye process.

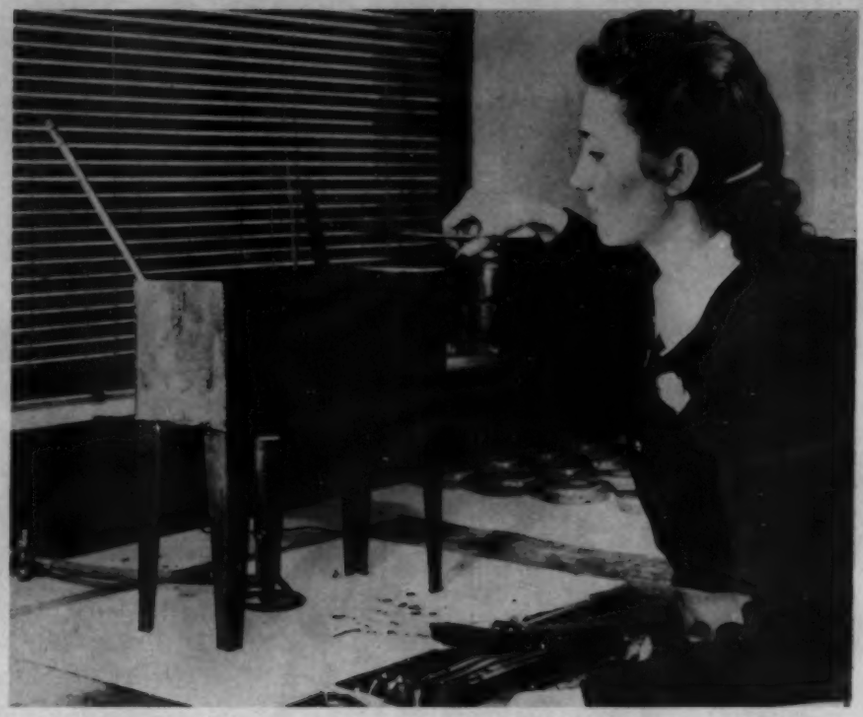


Fig. 4—Original small oil tank used in conjunction with processing tanks in Fig. 1. Oil is heated by single gas burner below. Temperature checked by thermometer projecting from tank at left

WHY OIL? The question arises, "Why is oil necessary. Can't you get the same results by heating in air or other mediums?" As a matter of fact, equally good results have been obtained by use of salt baths and under water (when the water was held under sufficient pressure to permit reaching the desired temperature of 350 degrees without flashing into steam). There is no reason why good results could not also be obtained in furnaces with controlled atmospheres.

Oil is used merely because it prevents oxidation of the metal during the prolonged treatment at the elevated temperatures and because it is most convenient to use in production work. A simple sheet metal tank and a gas burner under it serve well. Since the temperature is not critical, automatic control is not necessary, although it is convenient. Any temperature within the range from 300 to 400 degrees Fahr. appears satisfactory.

Nor is there any requirement as to type of oil. Any oil that will not catch fire at the operating temperature will work. About 40 different oils have been tried with no perceptible difference in results. A heavy oil is recommended as it helps reduce the fire hazard and is accompanied by minimum loss by evaporation.

The following oil has been found satisfactory: Viscosity, 150 to 175 seconds Saybold; flash point, ASTM open cup test, 510 degrees Fahr. minimum; fire, 590 degrees Fahr. minimum; power test, plus 25 degrees Fahr.; Conradson carbon test, 1.00 per cent; acidity, neutral.

OPTIMUM CONDITIONS: When comparative tests of the process show improvements ranging all the way from 30 to 3000 per cent as was described in part one June 14, it is obvious that much remains to be learned as to how to utilize the process most effectively. Considerable research is yet to be done before the best plate for each type of work and optimum conditions for obtaining it will be found.

For example, the thickness that gives longest life on various cutting operations has not yet been determined. It would seem logical that the thickness working best on a drill might not necessarily work best on a broach or on a high-speed steel form cutter operating at high temperatures or on tools experiencing still different working conditions.

Thus users of the process are urged to experiment with their own applications to find the particular thickness of plate giving maximum results and to determine optimum conditions for producing that plate.

RESHARPENING: One point that becomes evident in studying reports of comparative tests is that the greatest increase in life is provided by using the tool as it comes from the heat treatment —that is, without sharpening after plating. When it is necessary to sharpen a tool because it has become dull through use, the usual experience reported was

(*Please turn to Page* 127)

A lack of experience need not reduce inspection precision

It does require both skill and experience to handle close tolerance work on the time-honored fixed size gages—and skilled inspectors are scarce. But that need not interfere with precision in your plant.

Substitute for the gages that require skill, the gaging instruments which give you greater precision and at the same time eliminate the human factor. Sheffield precision gaging instruments in the hands of inexperienced inspectors are guarding product quality in hundreds of plants today.

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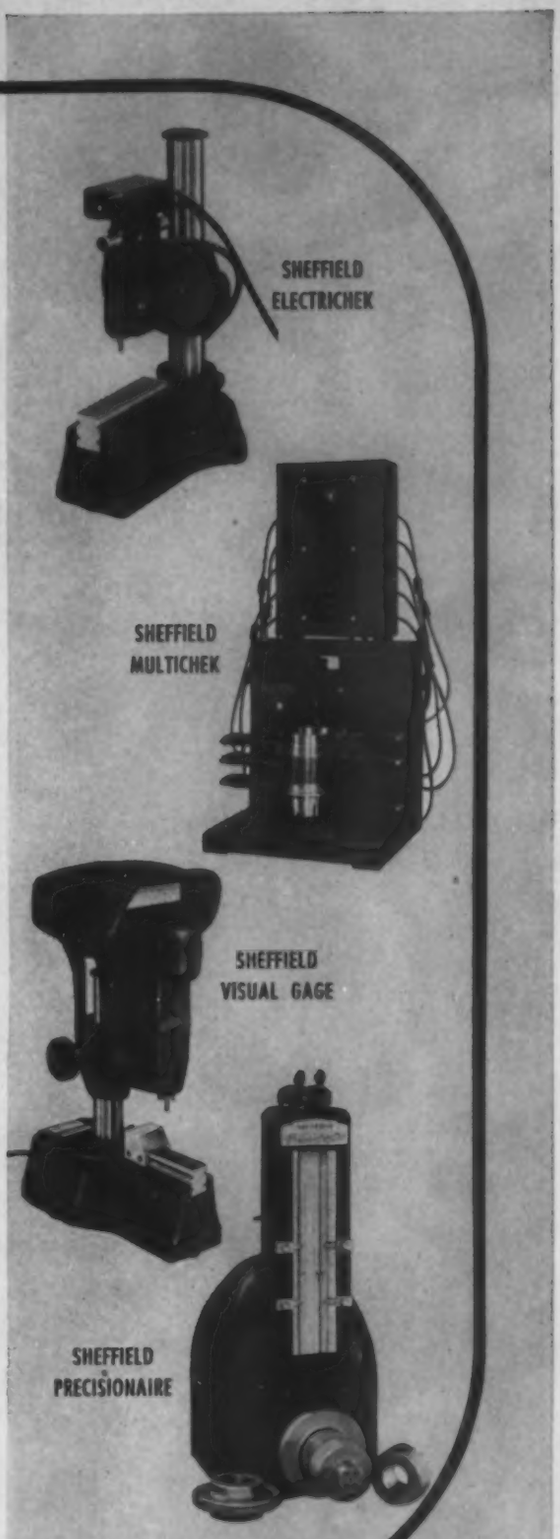


THE SHEFFIELD CORPORATION

DAYTON, OHIO, U. S. A.

SHEFFIELD GAGES
MASTER GAGEMAKERS

Low-Expansion Alloy Made Free-Machining

THE USE of the 36 per cent nickel alloy known as Invar has long been limited by machining difficulties. This problem has now been overcome by the development of a free-machining grade of Invar now in commercial production, according to the metallurgical department of the Carpenter Steel Co., Reading, Pa.

For some time, various forms of Invar have been used in applications where science must overcome or minimize the natural tendency of metals to expand when heated. By providing a rate of thermal expansion approximately one-tenth that of carbon steel at temperatures up to 400 degrees Fahr., this alloy is contributing to the accurate operation of radio and electronic devices, aircraft controls, thermostats, etc.

Whereas regular Invar bar stock is extremely difficult to machine, the new type, known as Carpenter Free-Cut Invar "36", is claimed to machine easily with a saving of as much as 72 per cent in machining time. The addition of selenium to the alloy gives it the free-cutting properties, yet does not alter the metal's low thermal-expansion characteristics. Anyone familiar with the difficult machining properties of 18-8 stainless steel before the free-machining type came into use will have an idea of the difficulties involved in machining the regular type Invar bar stock. Actually, straight 18-8 is easier to machine than regular Invar, although this stainless work hardens while Invar does not.

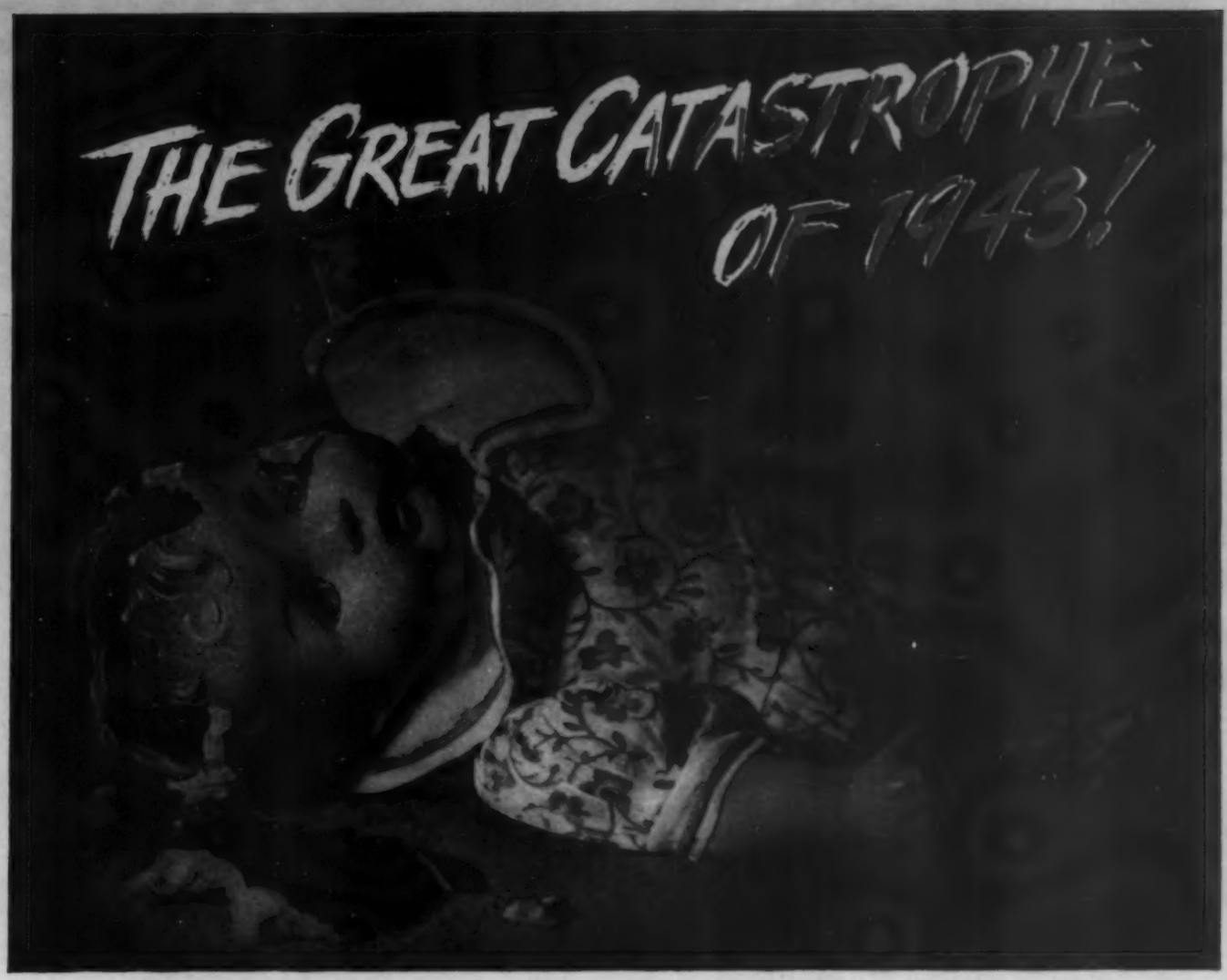
Comparative Tests: To demonstrate the free-machining properties, comparative tests were made on bars of both the regular and new free-machining types. In these tests standard high-speed steel cutting tools were used, ground with standard angles such as regularly used in run-of-mine shop work. Table I contains a summary of the results of these various tests. In all cases, machines and tools used for making these tests were identical.

The accompanying illustrations show details of the actual operation of these various machining tests. A study of them provides additional information regarding the relative machining properties of the two grades of Invar. For example, the difference in the chips produced and machined finishes are definite indications of the free-cutting properties of the new alloy.

Relative Machinability Test—Roughing Cut: In rough turning a bar of regular Invar, burred edges were produced while the same operation performed on a bar of the new free-machining grade gave smooth edges.

TABLE I—Tests to Determine Relative Machinability

	REGULAR INVAR (non-free machining)		CARPENTER FREE-CUT INVAR "36"	
OPERATION	SPEED	REMARKS	SPEED	REMARKS
ROUGHING (Bar 1" round) Cut: $\frac{1}{16}$" Feed: 0.0055"	28.80 sur. ft./min.	Machining satisfactory.		
	40.22 sur. ft./min.	Tool failed after cutting about 1" along bar.		
	82.47 sur. ft./min.	Tool failed after only a few revolutions.	82.47 sur. ft./min.	Machining satisfactory. No effect on tool.
			137.45 sur. ft./min.	Top speed for the lathe used. No indication of failure. At this speed feed was increased from .0055" to .0125" with results still satisfactory.
FINISHING Cut: 0.50" Feed: .0055"	23.40 sur. ft./min.	Indications were that this speed provided the best possible finish.	111.67 sur. ft./min.	This speed gave a very good finish. With feed increased to 0.0125" the finish was still good.
NOTE: This test made to determine highest speed possible for satisfactory finish.				
DRILLING $\frac{7}{16}$" round high speed drills. Test block $2\frac{5}{16}$" thick. Feed: .004" per revolution.	665 RPM	Drill failed completely when hole was only $1\frac{1}{16}$" deep.	665 RPM	Drill went through entire $2\frac{5}{16}$" test block with ease. After test, drill still in good condition.
THREADING Single point tool. Ten threads per inch. Two roughing cuts @ .04". Two finish cuts @ .004".	60 RPM	Two rough cuts resulted in "torn" threads. Two finish cuts failed to provide satisfactory threads.	188 RPM	Same number of rough and finish cuts made. Threads greatly superior to those on regular Invar sample.
NOTE: This test made to determine highest speed for best possible threads.				



"It was exactly ten o'clock. I know, because I'm sittin' there with my brother-in-law and his wife, and they just got through sayin' it's ten o'clock and they better get home, when suddenly the lights go out. 'That's funny,' I says. 'Yeah, must be something the matter,' my brother-in-law says, 'call 'em up and ast 'em.' So I'm huntin' for the phone, and nearly break my neck when I step on the kid's doll, and then I pick up the phone and there don't nobody answer."

With some such homespun speech as this would many an American commence his version of the Great Catastrophe of 1943 — if by some freak of natural phenomena every electric line in the country should suddenly go dead.

Imagine, if you can, this entire nation without electricity, barely 70 years after the first electric lines appeared. "Brother, I want to tell you that was one hell of a mess," the sidewalk historian would go on to say. And he'd tell how industry, without power for its electric machines, stopped dead. How transportation got tangled, and all communications were out. How food began to spoil, and fuel supplies dwindled, and cities were without water. And how ignorance and fear fanned the growing national panic as the dread spectres, Crime, Famine and Disease swept over the land.

Preposterous? Certainly. Yet we can think of no more graphic way of illustrating our national dependence today upon the electrical industry. And that entire industry — with its countless products and blessings — was made possible by a relatively few basic precision machine tools!

Jones & Lamson was in at the very birth of the Electrical Age in America, and literally millions of different parts, products and machines have stemmed from machine tools designed and developed by this one company.

In the swiftly changing world of today, such a background as this is of great value to American industry. For it means that Jones & Lamson engineers and service men are among the best qualified machine tool specialists in America to assist your own engineers in meeting changing production problems. Call upon them!

Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Die Heads

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Profit-producing Machine Tools

Relative Machinability Test—Finishing Cut: Following the completion of rough cutting tests, finishing cuts were made on the same two bars. Compare the chips and finish in Figs. 1 and 2. Fig. 1 is regular Invar, Fig. 2 free-cutting Invar. This test was made not only to determine the fastest cutting speeds possible, but also to find the maximum speed at which the best finish could be secured in each case.

Relative Machinability Test—Drilling: In this test, a 2 3/16-in. thick block of each grade of Invar was used. The drill shown in Fig. 3 cut through 1 1/16-inch of regular Invar and was badly burned. The drill in Fig. 4 cut through the entire 2 3/16-inch block of free-machining Invar without failing. The chips to the left of each drill are those produced in the respective tests.

Relative Machinability Test—Specimens: These unretouched photographs of test bars of regular Invar, Fig. 5, and free-machining Invar, Fig. 6, show that threads cut on the free-machining grade are smoother. Also, no burrs resulted from machining and drilling the free-cutting grade of Invar.

New Applications Now Made Possible: The low expansion properties of the newly developed free-machining alloy are exactly the same as those of the non-free-machining grade. Thus, the new ease of machining will make possible many additional applications and increase the usefulness of this material. Where precision parts with low thermal expansion properties must be machined in quantity, its free machining qualities will help to increase output per man-hour. Then too, it may help to effect mechanical improvements through better finishes and thus fewer difficulties in service.

Paint Plant Makes New Rubber Substitute

A rubber substitute that can be made in paint factories from vegetable oils and without use of critical materials is reported as suitable for food jar rings, cements, stoppers, erasers, floor mats, tapes and other civilian war products.

Developed by Sherwin-Williams Co., Chicago, Kem-Pol, as the substitute is known, was recently described by W. T. Walton, research chemist in charge of Kem-Pol production, as not a synthetic rubber, but rather a replacement or extender for natural, synthetic and reclaimed rubbers in those cases where lower tensile strength and elongation are permissible.

Already being produced in carload lots by the Chicago plant, the substitute is being offered in four different types —Kem-Pol No. 14, intended for use as an adhesive; No. 54 also used as an adhesive, but can be milled and rolled; No. 11 for use in the preparation of mill stocks and molded goods and No. 11-41 also for mill stocks and molded goods. The last type can be worked directly on the rubber mill without pretreatment.

Tells Part Grain Size Plays in Tin Alloys

Interesting information on the part played by grain size in the properties of pure tin and tin-rich alloys is given in the Tin Research Institute's latest publication No. 118, a reprint of a paper by Dr. W. T. Pell-Walpole which appeared recently in the *Journal of the Institute of Metals*.

Dr. Pell-Walpole's investigations show, according to the reprint, that variations in tensile strength are controlled by the number of grains in the cross-section, and not by the absolute grain size. In rolled material, an increase in tensile strength is observed as the number of grains in the cross section increases from 1 to 20 or 30. Elongations, it is said, are constant over this range. A further reduction in grain size produces only a slight increase in tensile strength, but elongations increase rapidly.

The discontinuity in the relationship between tensile strength and grain size is shown to be caused by the corresponding discontinuity in the extension grain size curves. With chill-cast specimens, consisting entirely of columnar grains, tensile strengths increase continuously with reduction of grain size, and elongations are either constant or increase only slightly.

Free copies of the publication are being offered by the institute's headquarters, Fraser road, Greenford, Middlesex, England.

Starts Research on High Speed Industrial Heating

Investigation and development of possibilities inherent in heating steel and other materials with gas at speeds heretofore unattainable is the subject of a new research project authorized by the American Gas Association.

According to John W. Batten, chairman, committee on industrial gas research, recent developments in the metallurgical field have caused some heating practices of long standing to be questioned. Among them are the rates at which metals can absorb heat and the practical value of the customary soaking period. It is believed by many that many of the long established heating cycles can be greatly reduced in time with important metallurgical and economic benefits, subject only to the ability to force heat into the materials at accelerated rates. To the extent that this is true many heat treating cycles can be cut from customary extended lengths down to a matter of a few minutes.

General objectives of the project have been set forth as follows:

To establish the effects of high speed, direct heating with modern gas-air combustion on the metallurgical, working and production properties of ferrous and nonferrous metals, both standard and National Emergency types, as heated for forging, normalizing, annealing, hardening, drawing, rolling, extruding etc.

To compare these effects with the corresponding effects of conventional furnace heating and of other methods of high-speed heating.

New Directory Covers Industry in Canada

Canadian Trade Index; cloth, 842 pages, 6½ x 10 inches; published by Canadian Manufacturers' Association Inc., Toronto, Ont., for $6.

In the 1943 edition of this authoritative directory of all products manufactured in Canada and the names of the firms making them, the purpose is to provide buyers and sellers with complete information. Annual revision keeps it up to date, the changes running into hundreds every year.

It includes an alphabetical directory of more than 8000 Canadian firms, with addresses, branches, export representatives, trade marks and brands; a directory classified according to products made; a directory of exporters of agricultural products and allied lines; an export section giving details of government services; an alphabetical list in French of the headings in the classified section, with parallel English and a limited similar list in Spanish.

FOR WAR TODAY—FOR YOUR PRODUCTS TOMORROW

DIE CAST INDICATING LAMPS IN WAR PLANES

Two sizes of lamps and a set of the die cast parts

Did you ever get a look inside an Army plane? The thing that impresses you most is the maze of dials, switches, indicators, etc., required to "keep 'em flying." Only the finest materials and workmanship of the electrical industry go into this equipment, and it is significant that zinc alloy die castings serve here in many ways.

Take, for example, the indicating lamps which flash operating guidance to the plane crew. Many of these lamps —which are used on Radar panels, too — are assembled with zinc alloy die castings. The lamp castings shown above, which include the housing, bezel and assembly nut, are all cast in the same die. The external threads on the housing are integrally cast and require only a simple chasing operation. And a further feature obtained in the casting operation is a tiny lug (see arrow) which prevents the indicating lamp from turning after it is embedded in the panel.

THE New Jersey zinc ALLOY POT

A publication issued for many years by THE NEW JERSEY ZINC COMPANY to report on trends and accomplishments in the field of die castings. Title Reg. U. S. Pat. Off.

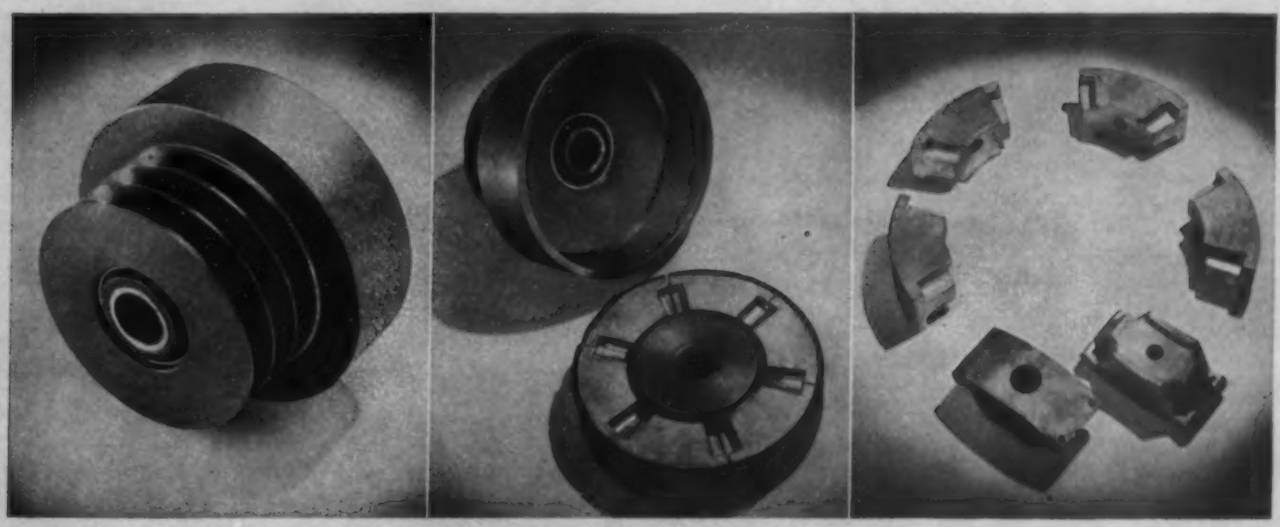
STEEL MAGAZINE EDITION No. 11

ZINC ALLOY DIE CAST CLUTCH SEGMENTS

The operating principle of the centrifugal clutch illustrated below (left) is embodied in the adjustable feature of the six zinc alloy die cast segments (right). These segments have adjustable spring-screws which keep them against the clutch hub to overcome the centrifugal force up to the adjusted speed—at which point the segments fly out and engage the clutch by a braking action on the drum. There is a facing riveted to each segment for this purpose.

The clutch drum and integral pulley rotates on two ball bearings, and a V-belt drive is used to transmit the power from an engine crankshaft to any operation desired.

By die casting the segments in zinc alloy, the necessary weight is obtained (approx. 14 oz.) and the hole for the adjusting pin is cored in the casting operation. The only machining required on the segments is the drilling of the four rivet holes for applying the brake facing.



The die cast segments are adjusted to the desired clutch speed

THE NEW JERSEY ZINC COMPANY 160 FRONT ST. NEW YORK CITY

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

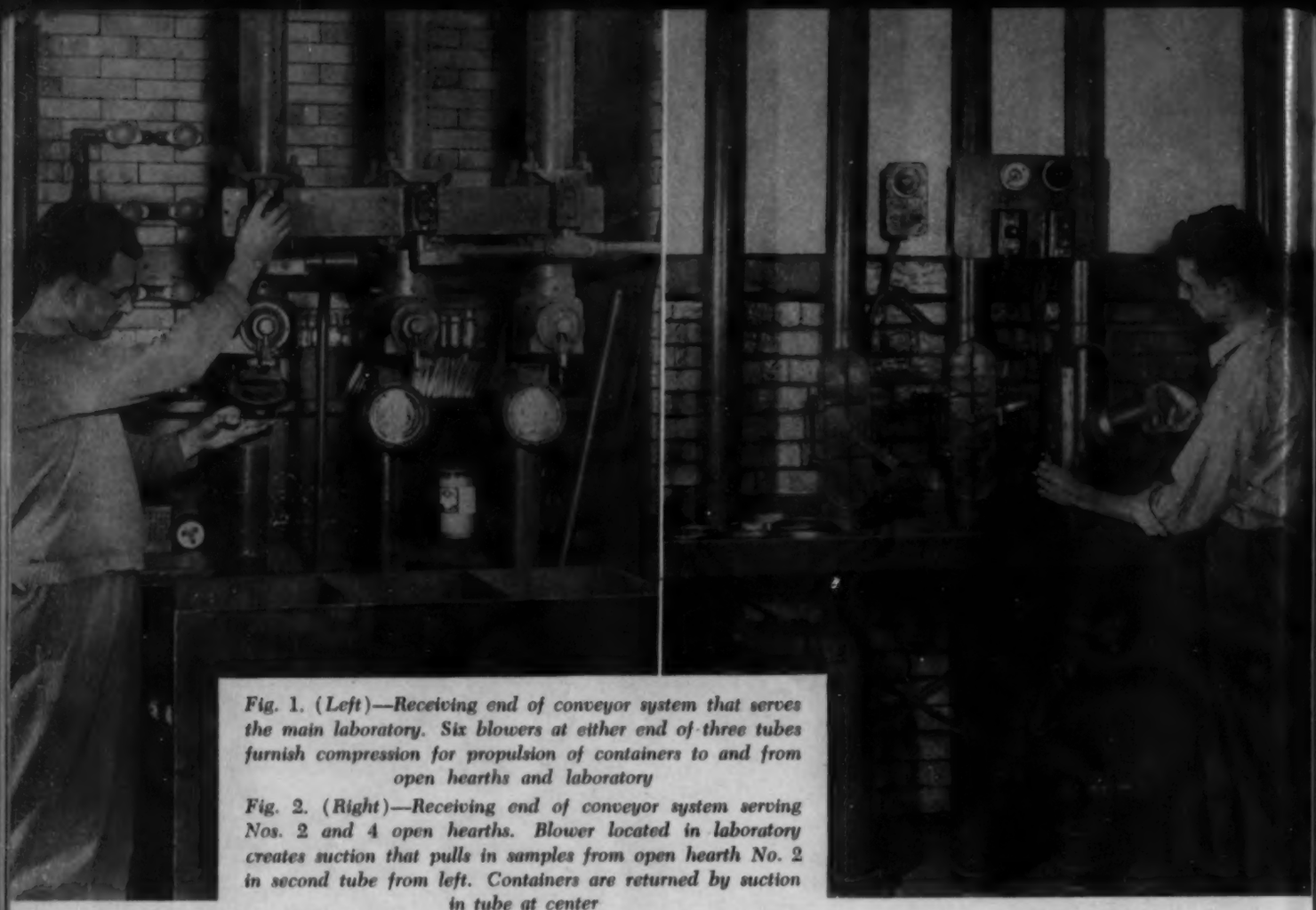


Fig. 1. (Left)—Receiving end of conveyor system that serves the main laboratory. Six blowers at either end of three tubes furnish compression for propulsion of containers to and from open hearths and laboratory

Fig. 2. (Right)—Receiving end of conveyor system serving Nos. 2 and 4 open hearths. Blower located in laboratory creates suction that pulls in samples from open hearth No. 2 in second tube from left. Containers are returned by suction in tube at center

3-MILE CONVEYOR

Aids Test Work

By WALTER BARNETT
Chemical Control Laboratories
Bethlehem Steel Co.
Bethlehem, Pa.

THE PNEUMATIC conveyor system is no novelty in the steel industry. It was in use 40 years ago, and gradually entered into competition with lads in their teens who in some plants did the work of shuttling hot metal test specimens between open-hearth floors and laboratories located at a distance. In recent years it has come into wider use, largely as a result of the trend toward centralized test laboratories, now replacing compact quick-test plant laboratories located close to melting facilities.

The pneumatic tube conveyor lends itself well to today's common types of sample specimens, such as drillings or poundings, or spectrographic "pins". These light forms of samples, as contrasted to the block tests that were formerly employed, travel in the tubes very speedily, entailing little wear and tear. However, there is probably still an advantage in designing the tubes large and sturdy enough to handle block test samples. Then, too, increased emphasis on slag tests provides a tube conveyor system with just that much more work to do.

Pneumatic conveyor systems are becoming of special value as a result of increased use of spectrographic testing. In large steel plants with central spectrographic laboratories it is essential that rapid means of transporting samples be available. For this application the pneumatic conveyor system is virtually mandatory.

The latest addition to the extensive pneumatic tube conveyor systems now in operation at the Bethlehem plant was necessitated by installation of a centralized spectrographic laboratory in 1942. At this plant the centralized spectrographic laboratory, connected by conveyor systems to open hearth and electric furnace units, is proving invaluable in getting out the present heavy schedules of alloy steels.

At present the Bethlehem plant has more than 3 miles of pneumatic conveyor systems that handle samples from five open-hearth and electric furnace steel melting units. Three connect with the main laboratory, where the spectrograph is located, and two with a large conventional open-hearth quick test laboratory. The lines are made of 4-inch diameter seamless steel tubing connected at the joints by flanged couplings. The couplings are fitted with rubber gaskets which allow for expansion and contraction due to temperature changes and yet maintain an air-tight union.

Aside from the "pin" samples (7/32-inch in diameter and 2 inches long) required for spectrographic analysis, types of samples that the line is capable of handling range from prepared metal poundings, drillings and nibblings, slag specimens, etc., to ladle of block test specimens, which may weigh 4 or 5 pounds. Pins and prepared samples

MAKE YOUR OWN TESTS!

PHOTO FROM PRESS ASSOCIATION, INC.

WE KNOW RACO TYPE D COMPOSITE ELECTRODES WILL MAKE GOOD!

Results most nearly comparable to those obtained with Standard Shielded Arc Electrodes! That's what we claim for Raco Type D Composite Electrodes... and we invite you to make a test on either automatic or manual welding in your own plant.

If you can't get Shielded Arc Electrodes ...and you are welding mild steel or galvanized material... by all means, look into the advantages of Raco Type D. Raco Type D is unique...a patented electrode with the flux coating applied to the core wire under tremendous pressure during the wire drawing operation.

There is nothing on the market to compare with it. It is entirely different from washed, dusted or dipped electrodes. AND RACO TYPE D GIVES THE CLOSEST RESULTS TO STANDARD SHIELDED ARC ELECTRODES THAT CAN BE OBTAINED!

WE CAN MAKE PROMPT DELIVERIES OF RACO TYPE D ELECTRODES. SAMPLES OF STANDARD SIZE ELECTRODES WILL BE PROMPTLY FURNISHED ON REQUEST.

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REID-AVERY COMPANY

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Makers of Raco Type HD Shielded Arc Electrodes for Stainless Steel, Mild Steel. Raco Type M and Type D Light Coated Electrodes for Manual and Automatic Work. Samples and Literature on request.

are inserted in small envelopes and these in turn are inserted in sample "carriers" or containers. One of the lines is occasionally utilized for conveying tensile-test specimens for physical testing, prepared at a machine shop located adjacent to one of the electric furnace units that the system serves.

Two sizes of sample carriers are in use, both being made of 2 3/16-inch outside diameter steel tubing, but one is 3 inches in length and the other, 5 inches long. The 3-inch size is used most, as it is able to accommodate all types of specimens except large ladle-test samples. The ends of the carriers are fitted with felt butts that reduce shock and friction, while a thin rubberized disk that fits closely with the inside diameter of the conveyor tube reduces air leakage. It is important to the efficient functioning of the conveyor system that both the felt and the rubber on the sample carriers be renewed from time to time.

The longest conveyor line serving the main laboratory measures 5300 feet, while two other lines serving this laboratory measure respectively 2200 and 3200 feet. The three lines to the central laboratory are operated by six electrically powered blowers, as a blower is required at each end of each line to provide compression according to the direction that the container is to be sent.

The blowers for the 5300 feet line are operated by motors of 4 horsepower. Traveling time required for delivery of a sample varies somewhat according to the size or weight of the specimen, and whether the larger 5-inch long, or smaller 3-inch, container is used. One of the shorter containers carrying lighter types of specimens normally traverses the 5300 feet in about 2 minutes and 30 seconds.

Containers have been known to become jammed in the system for one reason or another. A connection with the regular plant air line is provided for such emergencies. Since the 110-pound pressure carried by this line is a higher pressure than the conveyor lines could withstand, due precautions are taken to throttle it down before application. Although there is rarely occasion for resorting to its use, containers that are jammed can usually be readily blown out by application of the higher air pressure, causing but slight delay.

All bends in the system are made at 60-degree angles. Experience has indicated that the container speed is highest when bends are held to this angle. Momentum gained on straight stretches helps to take the containers around the bends with only momentary slackening of speed. The 5300-foot line that has been mentioned makes a total of 19 lateral and vertical turns throughout its course, passing through a number of plant buildings enroute.

The exposure of any part of the conveyor tube to abnormally cold temperatures tends to cause precipitation of the moisture content of the air within the tube. To safeguard against such an occurrence which might cause rusting within the tubes and subsequent sticking of carriers, the conveyor tube is insulated with felt at all points exposed to the out-of-doors atmosphere. The breather pipes of the blowers are fed from the outside atmosphere so that the system will be filled with air approximating out-of-doors temperature and moisture content, a practice that also tends to check condensation.

The samples from the melting units arrive at the main laboratory building receiving station located in the "wet" chemistry laboratory. Pin tests for spectrographic analysis are transferred into smaller containers at this point, and are shot down to the spectrographic laboratory in the basement of the building. Here, a pneumatic conveyor system of lighter construction is employed. It is similar to the type employed in department stores for transferring money for change.

Due to the fact most samples consist of prepared specimens in the form of drillings or poundings, the bulk of the samples that come in for wet analysis could be handled in a system of lighter construction. However, the heavier construction and larger diameter tubes are provided to take care of all contingencies, and it frequently happens that valuable time is saved as a result of the system's ability to take specimens weighing up to 5 pounds when there is need of it.

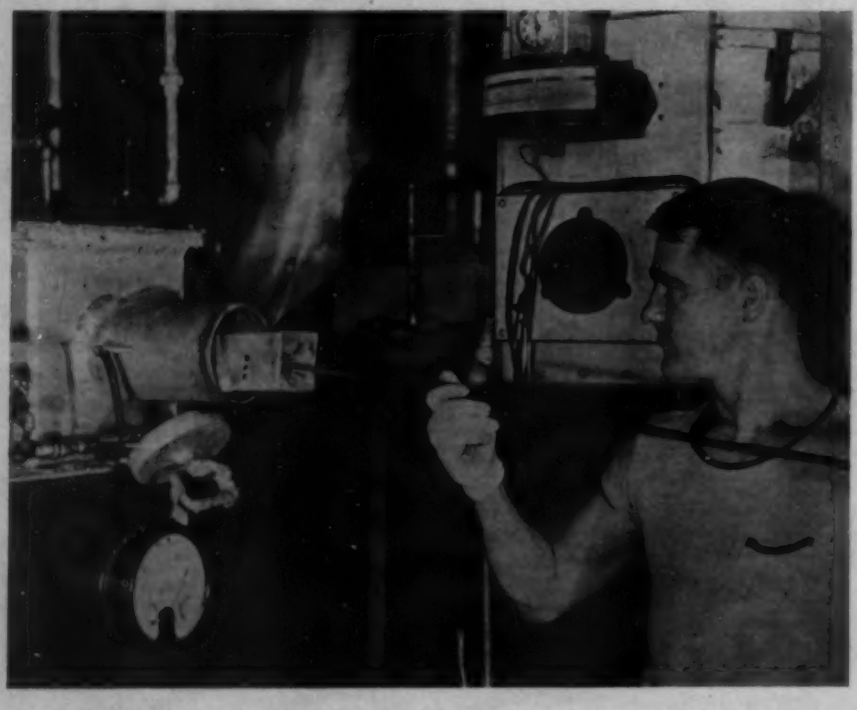
An improvement, now under consideration, is the further lightening or reduction of the weight of the smaller size of container, yet retaining requisite resistance to the battering that it has to withstand when carrying heavy samples. The load carriers are discharged at the laboratory into a container constructed of welded plates containing heavy wadded canvas to serve as a cushion.

Since traffic moves both ways in the tubes, an interlocking electrical system has been provided which indicates at each end when the tube is in use.

In addition to these lines to the main laboratory an independent pneumatic system serves the separate quick-test laboratory that is maintained to provide

(*Please turn to Page* 119)

ONE WAY TO ELIMINATE GASES FROM METAL



PARTS of radio transmitting tubes are heat treated in this furnace at the Westinghouse Lamp Division, Bloomfield, N. J., to temperatures of 2100 degrees Fahr. to drive out any traces of gas which may be imprisoned within the metal. Operator here is placing parts in the furnace where burning hydrogen prevents oxidation. After treatment, unless parts are to be used immediately, they are placed in a vacuum storage container to prevent reabsorption of gases. Even small amounts of gas in a radio tube would lessen or destroy its efficiency

PART 7-O-X REPORTED MISSING

Jim's mother has a telegram today. It trembles in her fingers as she reads—"missing in action"... the rest is somehow blurred. Nothing now, but to wait... and hope.

In a war plant nearby, another telegram is read. Part 7-O-X is late. Work stops. Lacking a vital part, some jeep, plane, gun or tank may never reach in time the front where Jim was fighting.

Yes, *thousands of tiny parts* make up the war machines that kids like Jim are counting on today.

Here at R B & W, making Empire Bolts and Nuts, it's our job to make each one accurately-threaded to tighten fast and grip hard, strong to take the battering of battle, fit for the faith our fighting men must place in it. Our responsibility, too, to make it *on time*, so that no part of ours "missing in action" will mean *men* "missing in action".

You, too, may be making all-important "bits and parts" for war equipment that your workers never see. If so, this page, re-written as a poster for your plant, may help them visualize why *every part, even the smallest, counts.* Write us. The poster's free.

Russell, Burdsall & Ward Bolt and Nut Co.
Port Chester, N. Y.

RB&W *Making strong the things that make America strong*

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Moves

By RUSSELL R. HETZ
General Manager
Hetz Construction Co.
Warren, O.

Fig. 1—Plates of stove shell being removed by long-boom locomotive crane

Fig. 2—Open air shop in ore yard where parts were conditioned, replaced and altered

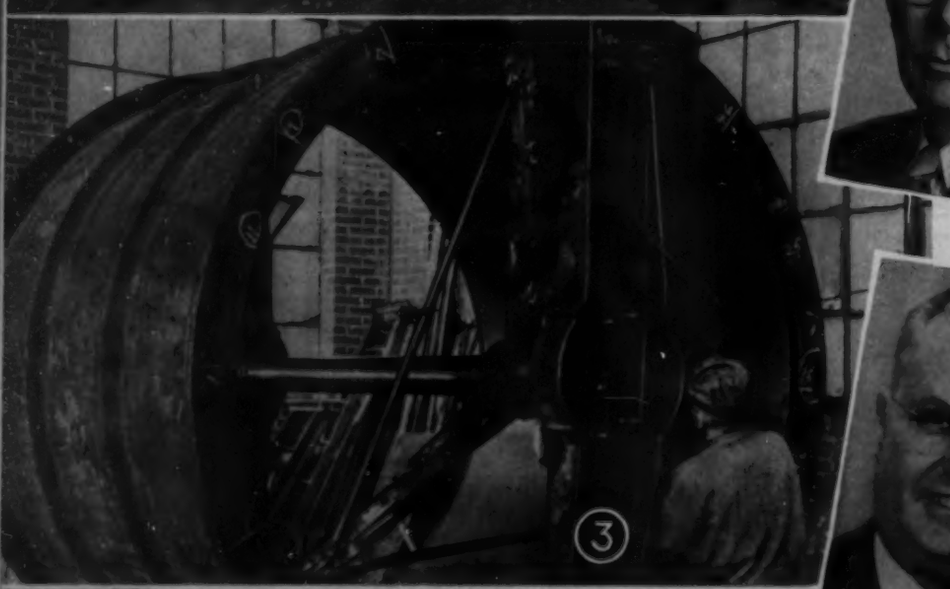


Fig. 3—Setup for reboring 84-inch blowing tub cylinder. Boring bar 6-inches diameter

Fig. 4—Rebuilt bending rolls in action

Fig. 5—Reconnected fitting on No. 3 stove. Fitted ring welded on to decrease size of hole

Fig. 6—Furnace property of Mississippi Valley Iron Co., St. Louis. The last cast of iron came out of the hearth in 1923

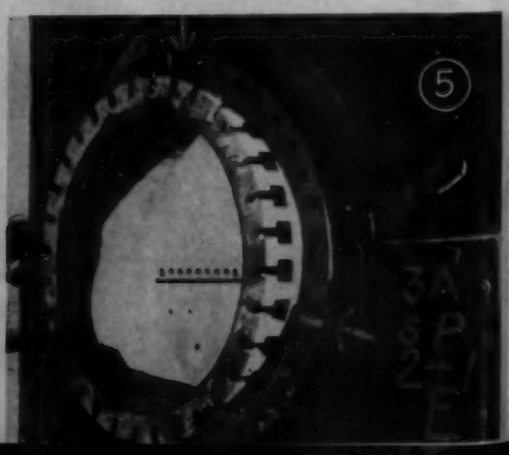
B. F. Charles
General Superintendent of Dismantling Work

Fig. 7—Before: Inside of taphole section of hearth jacket. Cracks were tack welded to prevent section splitting

Fig. 8—After: Reconditioned taphole section of hearth jacket

Fig. 9—Gas engine showing condition of generator and engine block

R. M. Johnson
Supervisor of Material Replacement Requirements



s Blast Furnace to Mexico

Abandoned stack retrieved from clutches of disintegration and obsolescence, then dismantled, rehabilitated and modernized for re-erection at a more strategic location. Work exemplifies interindustry cooperation, patriotism in the light of expediency, high cost of abandonment, use of old materials, resourcefulness and new dismantling methods

AN ANCIENT legend—that of the Egyptian bird—has been re-enacted in the case of the old Mississippi Valley Iron Co's. blast furnace plant at St. Louis. The stack, 76 x 15 feet, was built in 1916, rebuilt in 1920 and was last operated in 1923. Blast was supplied by two steam blowing engines and heated by four 2-pass stoves, 90 x 20 feet. It had a daily capacity of 350 tons of iron. This plant had been permitted to lose its unequal struggle with the arch enemies of all idle plants—corrosion and obsolescence—but due to the urgency of increasing the United Nations' iron and steel tonnage, it was decided to try to salvage this plant by using such parts as could be made serviceable and locating it where coke and iron ore could be obtained reasonably and economically.

Aside from the urgency of obtaining additional steel tonnage and the desirability of extending the good neighbor policy, it was found to be advantageous to the war effort to build an integrated steel plant in Mexico, so that pig iron, plates and steel could be available for production in that country, and for shipment to Gulf Coast shipyards if and when needed by the United States.

Armco International Corp., export division of the American Rolling Mill Co., Middletown, O., entered into a contract to construct and manage a fully integrated steel plant being built at Monclova, Coahuila, Mexico, by Altos Hornos de Mexico, S.A. The plant is being built with Mexican capital, the American Rolling Mill having no money in the project.

To have placed the blast furnace in operation at its former location would have imposed an additional burden on the already overloaded transportation facilities of this country, not only in bringing ore and coke to St. Louis, but also in shipping out the pig iron it would produce. By moving the plant to Monclova, Mexico, the transportation of Mexican ores and coke to the plant is borne entirely by the Mexican transportation system, and only the finished products will have a short haul over United States transportation to shipyards, etc.

The only reason this plant was taken was to minimize the drain on critical materials for the war effort, such as plate, copper, etc. Under normal conditions no time would have been wasted on this vandalized plant.

Working as agents for the Mexican government, the Armco International Corp. in conjunction with Day & Zimmerman, Philadelphia, engineers for the project, and taking advantage of the peculiar abilities and temperaments of the Hetz organization, made a success of this difficult undertaking. The project is an outstanding example of what can be done by gathering up loose odds and ends of steelmaking equipment and pressing them into use in the war effort. The general condition and design of the blast furnace plant was so completely in the clutches of decomposition and obsolescence that nothing short of a miracle could save it from the wrecker's hammer. One of the unsolved mysteries is why a plant decomposes faster while standing idle than it does when in use.

This installation, like many of the older merchant furnaces, had been added to and changed from time to time by the original owners, and from the viewpoint of Day & Zimmerman, the engineers, their greatest problem was to determine

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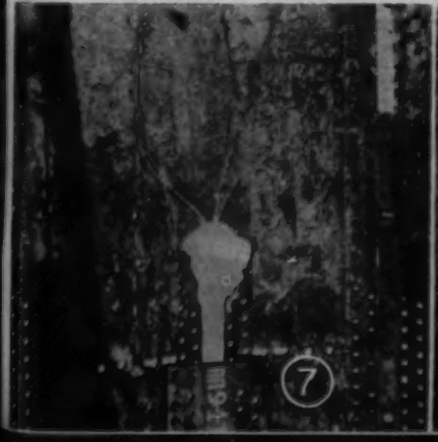
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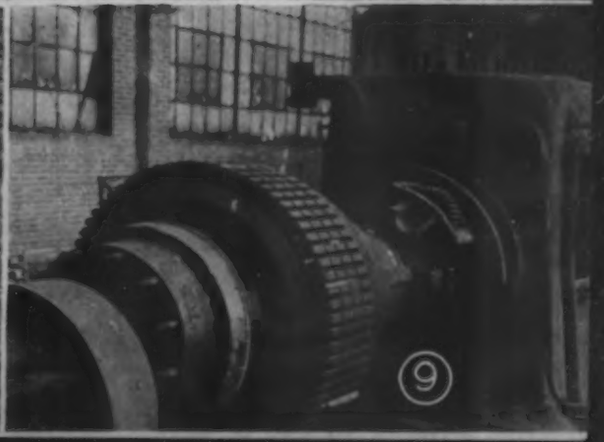
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just how much of the old design and construction could be incorporated with the necessary changes that must be made to have a reasonably modern furnace. Equally confusing were the decisions that had to be made from time to time as to just what the deadline was as to deterioration. Many pieces were so close to the border line that it was difficult to determine if it were practical to recondition them, and on many pieces it was extremely difficult to tell just where to stop on the renewal of parts. Many of these questions were solved by our ability to locate used facilities from which we could salvage useable parts and materials to replace the decomposed portions of the furnace. Considering the extremely bad state of decomposition in a furnace that has remained idle for many years, and with the plundering and sabotage that has been taking place in the many years of idleness and neglect, it is remarkable that a workable furnace could be had with a minimum use of critical materials.

To help round out the necessary equipment and materials to complete the plant, excellent cooperation and assistance was furnished by the United States Steel Corp. and several of the independents, such as the Tonawanda Iron Corp., N. Tonawanda, N. Y. A canvass was made of all idle production facilities in the industry and without exception any available items that could be adapted to the program were freely contributed by the other members of the industry. Of course, to fill the requirements for cranes, buildings, machine tools, etc., we were not necessarily limited in our search to the steel industry, and most of this class of equipment came from stone quarries that had been forced to curtail operations for the duration; these concerns were only too glad to make their idle equipment available to the war effort.

Possibly, for the first time an entire blast furnace plant was taken down with the use of a long boom locomotive crane. The orthodox method always has been the use of slow-moving, rather cumbersome derricks that cover only a portion of the operations, and if all of the facilities are to be dismantled concurrently, then it is necessary to have several of these derricks. Each derrick, of course, carries a complete crew, which means engineers and the necessary iron workers to do the hooking on, lowering etc. (the exact reverse of an erection crew). Present-day working conditions call for separate gangs for each operation, and the men doing the hooking on and lowering usually have a long waiting spell while the men cutting out the rivets free the piece that is "hooked on to" by the derrick. Mr. Charles' idea was to scatter rivet-cutting crews over the entire plant and as soon as the men in any particular crew had cut out all the rivets, backed them out and placed a few free running bolts to hold the piece in place they would proceed to the next plate, and in this way there was no work interruption and the long boom crane with its dismantling gang would go from one facility to another taking down the various pieces that had been previously prepared. In this way, greater efficiency was obtained in cutting out the rivets and likewise one erection gang (in reverse) did the work ordinarily performed by the several gangs that would be necessary to man the old style erection derricks. In this way there was a minimum of interference and long delays, and there was a constant stream of salvaged materials coming to the ground. It was necessary to extend the boom to a total length of 120 feet to reach the top of the stoves and the top platform of the furnace (the superstructure of the furnace was dismantled and lowered to the top platform with a gin pole and from there the pieces were picked off with the locomotive crane). These materials, of course, were all match-marked and after they reached the ground they were given another inspection to determine what, if any, conditioning or repairing was necessary.

The amount of conditioning, replacement and altering was such that the entire ore yard was cleared out and an open air shop was established. Here the old caulking edges could be chipped off and provisions made for new edges. The various parts could be cleaned and the necessary changes made under almost the same conditions as existed in the shop, barring of course inclement weather. Incidentally, the ore bridge had to be completely rebuilt and reconditioned before it could be used. This storage and repair area was under the traveling ore bridge, and to facilitate the repairs, bending rolls, drill presses, welders, etc. were spotted so that there would be a minimum of congestion in the flow of materials through the repair yard.

A corps of engineers was kept busy match-marking the various parts, denoting which pieces were reusable without repairs and which were to be reconditioned, or scrapped and replaced by field fabrication. Reconditioned parts had to be crated for export shipment, and it was also necessary to prepare complete shipping lists of every piece, bolt and nut, to reduce confusion at the re-erection in Mexico to a minimum. The difficult job of general superintendent for this work fell on the shoulders of B. F. Charles, who has had 35 years' experience in the fabrication, repair and construction of blast furnaces, steel mills and equipment, both in the shop and in the field. Mr. Charles was assisted in the undertaking by R. M. Johnson whose job was to

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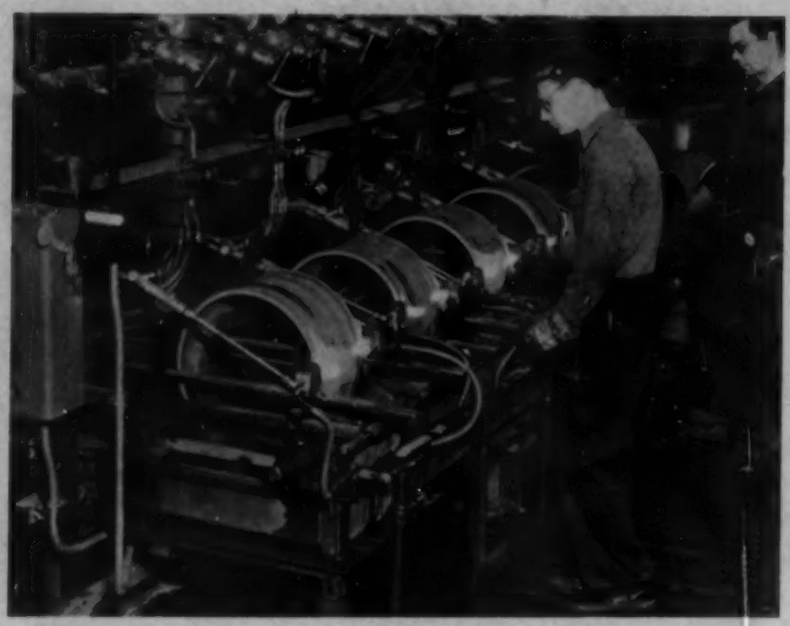


HARDENING BOGIE WHEEL TIRE BASES: Using specially designed flame ports and oxy-acetylene gas, the battery of flame hardening units shown here in the plant of American Welding & Mfg. Co., Warren, O., handles five bogie wheel tire bases at one time—revolving them past the flame ports about 8 inches per minute. This provides both flange edges of the bases, used on Army vehicles, with the necessary hardness without distortion

LESSONS FOR TRAINEES
WARTIME PIPING INGENUITY!
WHEN YOU'RE SHORT AN ELBOW
SAVING A JOB WITH BUSHINGS
HOW TO MAKE A SCREWED REDUCING FLANGE

Tips on Valve Trim
How to Repair Valves
Short-Cuts to Faster Piping Jobs
FOR SPECIFIERS
FOR CONTRACTORS
HELPFUL HINTS ON CHOOSING VALVES FOR BETTER PIPING SERVICE

Ask for as many sets as you can use. First come, first served.

"Piping Pointers" Give the Answers

On the ingenuity of piping men depends the flow of our fighting supplies. How to get pipe lines installed and keep them working right despite material shortages is what today's piping trainees must learn quickly.

For your trainees, there's valuable help in Bulletin 6 of the "Piping Pointers" series—a Crane service aiding hundreds of plants in better wartime maintenance. Examples of the hints it gives—short cuts to faster piping jobs—practical suggestions on substitutions for critical materials—are shown above.

FREE ON REQUEST—**As the leading maker of valves and fittings, Crane Co. gladly shares the basic information on which "Piping Pointers" are founded, to help all industry get better service from piping equipment. Copies of Bulletin 6 and others supplied free by asking your Crane Representative, or by writing to: Crane Co., General Offices, 836 South Michigan Avenue, Chicago, Illinois.**

ARMY E NAVY

CRANE VALVES

By WALTER J. BROOKING
Director
Testing & Research
R. G. LeTourneau Inc.
Peoria, Ill.

How To Utilize Most Effectively the . . . .

flame cutting

Of Parts for Arc Welding

Fig. 6—In transition from experimental to mass production of a machine such as this, earthmover and tractor, careful checking of parts and their cutting templets is most important to avoid bad fits and costly welding

(Concluded from Last Week)

PROBABLY one of the most important phases in the mass production of a machine (such as shown in Fig. 6) by the arc welded method is proper checking of the parts of the first unit as they are put together. At the same time the templets must be carefully checked for such adjustments as may be required. This work must be done before the production orders start.

Careful attention paid to the experimental fit-up and the corresponding faithful adjustment of the templets to assure desired changes in the parts will pay for itself many times over in smoothness of operation and absence of poor fit-up in subsequent production runs.

Storage of Flame-Cutting Templets: A difficult problem confronting the manufacturing of flame-cut parts is correct storage of templets. Those for some types of machinery may be extremely large and of a shape which makes it almost impossible to put them in cabinets or large lockers. Fig. 7 shows one solution to this templet storage problem in a cutting department, where large templets of steel or wood are used.

A templet rack built so templets may be hung upon it without fear of bending out of shape, having things dropped on them, or otherwise damaging them is a good investment. If each templet has its part number indicated by legible paint, it can be taken quickly and easily

Fig. 7. (Left, below)—Flame cutting templets represent a large investment in engineering work and control large expenditures of labor and material. Therefore they deserve to be stored carefully and protected from mishandling. Racks such as this help prevent damage, save time in locating a particular templet

Fig. 8. (Center)—Straight-edge helps this cutter to produce 100 per cent straight cuts, whether beveling or making square cut edges. Such a tool greatly reduces operator fatigue and improves smoothness of cuts as well as facilitating location of torch in starting cuts

Fig. 9. (Right)—Special templet fixture aids work on complex parts, eliminates need for laying out cuts, affords guide for operator so he can control cuts

Fig. 10. (Left)—Straight-edge is a great accuracy-of-cut-improver on all hand cutting work

Fig. 11. (Below)—Laying out cuts like these involves use of accurate templets

from the rack and after use it can be easily restored to its proper place. Since templets are the primary pattern for the cutting of valuable materials and for controlling large amounts of workmanship, it is extremely important that they be cared for properly. A small and insignificant appearing warpage or bending out of shape of an original templet may result in a costly defect in a large order of parts.

Storage of small templets and paper templets can usually be accomplished effectively by using large cabinets with shallow drawers. It is important that the drawers of such a storage cabinet be shallow so there will not be excessive handling of the templets in locating any one desired. Excessive handling of cardboard templets often bends their points and may even tear them. After such templets have been used for a few times, they may not reproduce with the degree of accuracy expected of them.

Control of Hand Cutting of Plates and Shapes: In modern welding practice, there are many parts which have small minor bevels on them which can hardly be cut at one time with a multiple-head automatic flame-cutting machine. Such parts must be cut by hand with an ordinary flame-cutting torch. Also, there is a large volume of shapes such as angles, box sections, pipes, channels, I-beams, H-beams, T-beams, etc., which do not lend themselves to mechanical flame cutting.

The cutting or guiding templet is one of the most effective devices for uniform hand cutting of straight cuts with or without bevels as well as small irregularly shaped parts. For straight cuts or straight bevels, a small straight edge like that in Fig. 8 is an effective means of steadying the operator's hand and helping him to produce quick, accurate, uniform cuts.

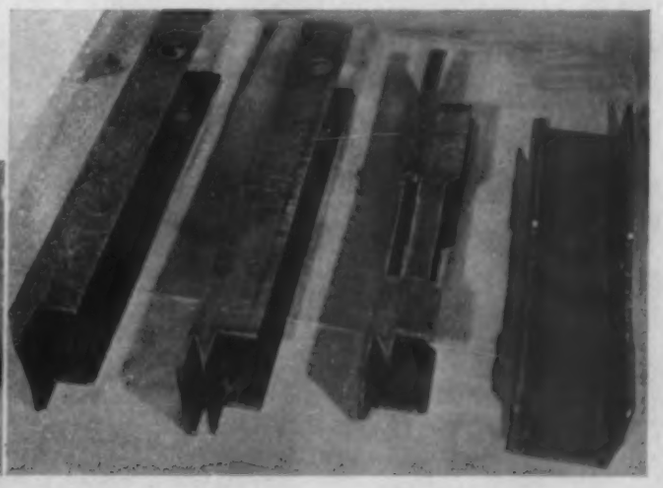
The same thing can be accomplished by making a small plug-like fixture for circular cuts or for irregularly shaped cuts. Such a fixture is shown in use in Fig. 9, the parts cut in Fig. 12. It should consist of a frame-like skeleton that is high enough to be handled easily for positioning quickly and accurately. It should have stops that can be set against some starting point on the piece. It should have an unbroken continuity of form so that the torch may be moved around it at a uniform speed and without any bumps or jogs. Such a fixture eliminates the process of marking and laying out by hand prior to the cutting operation and also allows the cutter to produce uniform and smooth cuts without the added strain of guiding the torch free hand.

The manufacture and use of templets on such flame cut parts as those shown

(*Please turn to Page* 120)

Fig. 12. (Below)—Templet fixture shown in Fig. 9 is in center with uncut blank left, cut work at right

Fig. 13. (Right)—Cut and bent parts such as web on lower end of channel at left (shown unbent second from left), require careful layout and skillful cutting of web and fillet sections. Correct fitup depends on the care with which these cuts are made, thus they greatly influence cost of part



An operation in production of better ammunition for our fighting men—J&L men join copper to steel.

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NEW-TYPE BULLET JACKETS FROM N

Teamwork on the production front as well as on the fighting front is vitally essential to winning the war. An example of war-production teamwork is the manufacture, for the first time, of copper-saving bullet jackets with a steel base.

One company, Superior Steel, developed the method for producing half-mile long ribbons of steel veneered with tissue-thin copper. Jones & Laughlin made its contribution by developing the squat H-section bars of steel so essential in the operation.

These bars are being rolled on the unique J&L 14-inch mill in thousand ton lots while another unit peens the outside plies of copper to the bars, and still another department, utilizing equipment ingeniously converted from peace-time strip production, rolls and reduces the wedded metals into glistening

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

INDUSTRIAL TEAMWORK

copper-surfaced strip. Then, a third company, National Can, cuts discs from the strip and forms them into thimble-like cups. A Government arsenal then shapes the cups into bullet jackets — steel jackets that are veneered with copper inside as well as outside — deadly in their impact on the enemy.

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J&L STEEL

FAST FREIGHTS

"Red Fox" is the name of a northbound fast freight train of the Seaboard Airlines, operating daily from Miami to Richmond. American railroaders have names for their crack freight trains as picturesque as names of passenger trains that are favorites with traveling public. "The Migrator" is the southbound counterpart of the Red Fox. Other Seaboard "name" trains are "Iron Master," Birmingham to Richmond, and "The Capital" southbound. There are two famous "Round Ups" in the service; the New Haven's fast freight running both directions between Harlem River and Boston, and the Chicago and Northwestern's westbound freight from Proviso (Chicago yards) to Council Bluffs. An eastbound freight with a western name is the Pennsylvania's "Ranchman" daily from East St. Louis to Enola, Pa., (Harrisburg yards).

Double feature freight, since it is operated jointly and in both directions by the Pennsylvania and the New Haven, is the daily "Speed Witch" between Baltimore and Boston. "Komet" is fastest evening freight of the Missouri-Kansas-Texas from St. Louis and Kansas City through to Galveston. "Bullet" is another evening train. "Klipper" is afternoon freight from St. Louis to Dallas and Fort Worth. Other picturesque fast freights are the New Haven's "Main Bullet" and "Cannon Ball"; the Pennsylvania's "Meteor," "Comet" and "Yankee," operating westbound from Harrisburg to Cleveland, to St. Louis and to Chicago, the "Flying Cloud" from Buffalo to Pittsburgh; the "North Star" Pittsburgh to Buffalo, "Man O'War," and "Eagle" eastbound out of Cleveland, and Chicago; the Northwestern's "Rocket," "Calumet," "Mohawk" and "Chief."

Mile of boiler tubing, made of finest grade steel, is required for average locomotive.

Cushioned with copper, a comparatively soft metal, bullet jackets protect and preserve the rifling in gun barrels, thus enabling longer use of the weapon for accurate shooting—invaluable in war time. Rifling imparts rotary motion to projectile, insuring greater accuracy of fire.

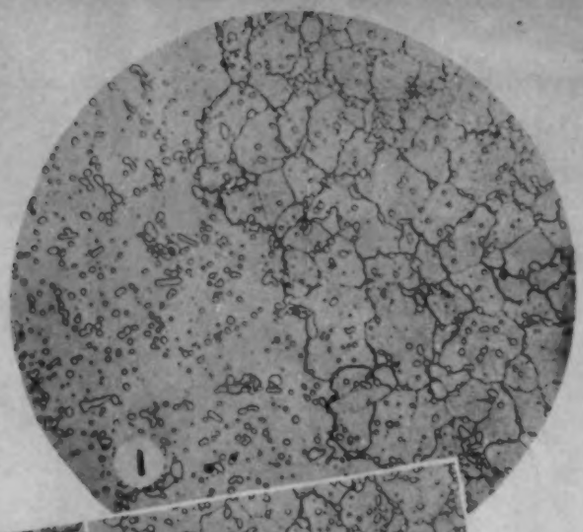
"To peen" says the dictionary "is to stretch or bend metal by indentation" (note use of word in text of advertisement). The hemispherical end of the familiar metal worker's hammer, opposite the face, is called a peen.

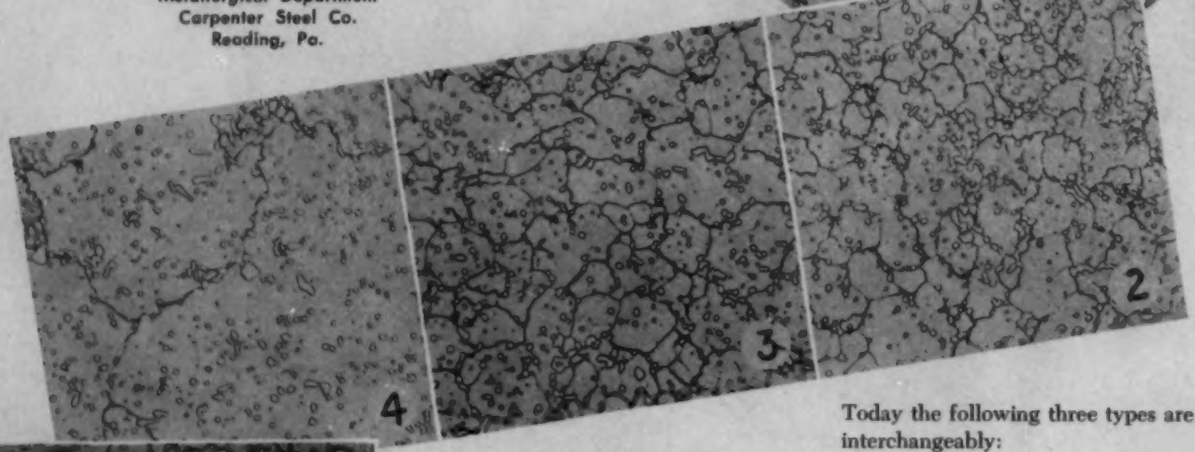
Soldiers were paid in tobacco in Maryland according to an Act of Assembly of April 26, 1758, "Ordering and Regulating the Militia of this Province." Colonels of foot were paid 2,000 lbs. of tobacco per month, Colonels of horse, 2,300 lbs. Lieut. Cols. of foot, 1,500 lbs.; of horse, 1,800 lbs. and so on down the lines to foot soldiers, 300 lbs. of tobacco per month, troopers (never referred to in the Act as cavalry) 600 lbs.

Heat Treatment of . . . .

HIGH-SPEED STEEL TOOLS

By WALTER A. SCHLEGEL
Metallurgical Department
Carpenter Steel Co.
Reading, Pa.





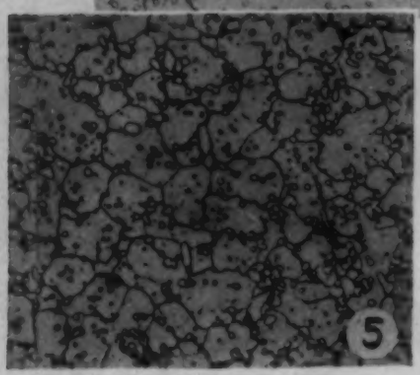


Fig. 1—Structure of steel B when stress relieved and rehardened

Fig. 2—Structures of steels A and C when stress relieved and rehardened

Fig. 3—Typical structure when fully annealed between hardening treatments

Fig. 4—Typical structure when double treated without intermediate anneal

Fig. 5—Typical structure of high-speed steel when given a single proper treatment

HIGH-SPEED steels are generally used in the manufacture of cutting, shaping, drilling and forming tools. Physical properties of high-speed steels at room temperature are not materially different from those of other tool steels. Their exceptional quality lies in their unique characteristics to develop secondary or red-hardness at high drawing temperatures, thus ensuring a keen cutting edge and excellent hardness at relatively high working temperatures. This makes them exceptionally suitable for machining metal at high speeds and feeds where rapid increase in temperature of the cutting edge is encountered.

The author was awarded the Henry Marion Howe gold medal by the American Society for Metals at the 1942 National Metal Congress and Exposition for his technical paper, "Surface Carbon Chemistry and Grain Size of 18-4-1 High-Speed Steel".

Heat treatment, of course, is necessary to develop red hardness in high-speed steels. The information here may serve to refresh the memories of those who may have done such work and may also be of material help to those who have had little or no experience in the treatment of these steels.

Before discussing heat treatment, it might be well to consider the general classes of high-speed steels. Prior to the present war a large percentage of high-speed tools were made from 18-4-1 steel containing 18 per cent tungsten, 4 per cent chromium and 1 per cent vanadium. As a result of war demands, tungsten became relatively scarce and other types of high-speed steel came into wider use. Today the following three types are used interchangeably:

Steel	C	Cr	W	Mo	V
A	0.80	4	5.50	4.50	1.50
B	0.70	4	18.00	. .	1.00
C	0.80	4	1.50	8.50	1.10

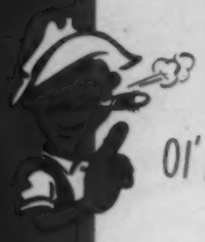
There are other types of high-speed steel but their heat treatment is similar to that described here.

In addition to many exhaustive laboratory tests, numerous confirmations from the trade have shown that the molybdenum high-speed steels are equal to 18-4-1 in performance. Where the molybdenum high speed steels are reported not entirely satisfactory, it is believed the difficulty lies in design and manufacture of the cutting tools themselves and not the steel. Excellent test results and actual performance obtained show the molybdenum high-speed steels to be the equal of 18-4-1, not merely a substitute for them.

Machining Tools: In making a high-speed tool be sure to cut away the bar surface from all portions of the tool before final heat treatment. For tools having a cross sectional area of 1-inch or less, remove 1/32-inch from all sides. For tools with larger area, remove 1/16-inch from each side.

In machining certain tools from flat stock, it is poor practice to machine three sides and then not to remove any of the bar surface from the fourth side, for such practice leads to distortion, may cause cracking, and in any event will result in undue heat-treating stresses.

To illustrate, two specimens of each of



Ol' Red Wabbler says:

Hytensite Rolls have the strength of steel...

The wearing and finishing properties of cast iron

The M-H Hytensite Rolls are high test alloy cast iron, specially treated. They contain appreciable proportions of visible graphite finely and uniformly distributed throughout, with a corresponding uniformity of structure of wearing and finishing qualities. They have a tensile strength of 60,000 to 100,000 lbs. per sq. in., with hardness of 50 to 70 Scl. (C scale). They are cast iron, and as such are free from the deleterious "notch effect" of steel. Small radii in the neck fillets and various passes, do not adversely weaken the roll.

You can have these extra qualities built into Mackintosh-Hemphill rolls — specify M-H Hytensite Rolls on your next order for finishing stands of Merchant Mills, Sheet Bars and Billet Mills.

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Rolling Machinery . . . Shape Straighteners . . . Strip Coilers . . . Shears . . . Levellers . . . Pinions . . . Special Equipment . . . Iron-Steel Castings . . . The NEW Abramsen Straightener . . . Improved Johnston Patented Corrugated Cinder Pots and Supports . . . Heavy Duty Engine Lathes.

MACKINTOSH-HEMPHILL COMPANY—Pittsburgh and Midland, Pa.

FERRO-BORON as an alloying material has gone into war production faster and to better purpose than could have been foreseen. The urgency of need has brought this about.

Boron is now an ingredient in vast quantities of high-grade irons and steels for armament, and for various demands of industry. Among the properties to which Boron contributes are hardenability and strength; and by contributing to these it eases the demand for some of the scarcer elements like molybdenum, chromium, and nickel.

A simple, economical, and highly satisfactory form in which to employ Boron for such use is a special Ferro-Boron developed by the Molybdenum Corporation. Compositions and procedures have been minutely checked and clearly defined.

Literature is available. On any application of Boron, Molybdenum, or Tungsten, correspondence is invited.

AMERICAN Production, American Distribution, American Control—Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.

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GRANT BUILDING PITTSBURGH, PA.

MCA

the three steels, measuring 2½ x ⅛ x 6 inches, were tested as follows:

One specimen of each type of steel was prepared by machining 1/32-inch from each of the four sides. The other specimen of the same size and from the same bar was machined by removing 1/32-inch from each of the narrow sides, while one of the flat sides had 1/16-inch removed. The second flat side retained the original bar surface. Both specimens now measured exactly 2 7/16 x 7/16 x 6 inches.

Test sections from steels A and C were heated to 2200 degrees Fahr. and quenched in oil. Test sections from steel B were heated to 2350 degrees Fahr. and oil quenched. Samples stood on the narrow edge while preheating and superheating and were held in a vertical position during the quench. Table I compares amount of distortion resulting.

All sections were carefully measured before and after treating and the results given in Table I are differences "out of straight." It is not to be inferred that a tool machined on all sides will not warp, since other factors bear an influence. Unequal heating, position in which the tool is placed in the furnace, the condition of the furnace hearth, the quantity of material in the furnace and the method of quenching—all are factors that influence warping. While being aware of these variables and guarding against them, it is believed that the excessive warpage shown in the second column of Table I was caused entirely by the fact that the original bar surface was retained on one face of the specimen.

When machining tools, deep machine marks should be avoided and sharp corners eliminated. Where sharp re-entrant angles are necessary, it is often advantageous to allow a small radius to reduce heat-treating stresses. If necessary, this small radius can be removed by grinding after the tools have been hardened and tempered.

Many high-speed tools must be stamped for identification. But deep stamp marks tend to concentrate stresses. Failures have often been traced to this cause. Stamp marks should therefore be made as shallow as possible.

Heat-Treating Atmospheres: Of the three high-speed steels under discussion, steel B is the easiest to heat treat. Practically any atmosphere with any type of furnace will result in freedom from decarburization. It is recommended, however, that an atmosphere with from 6 to 12 per cent carbon monoxide be employed since these atmospheres will result in a surface which is relatively free from scale and will not cause sharp edges

(*Please turn to Page* 122)

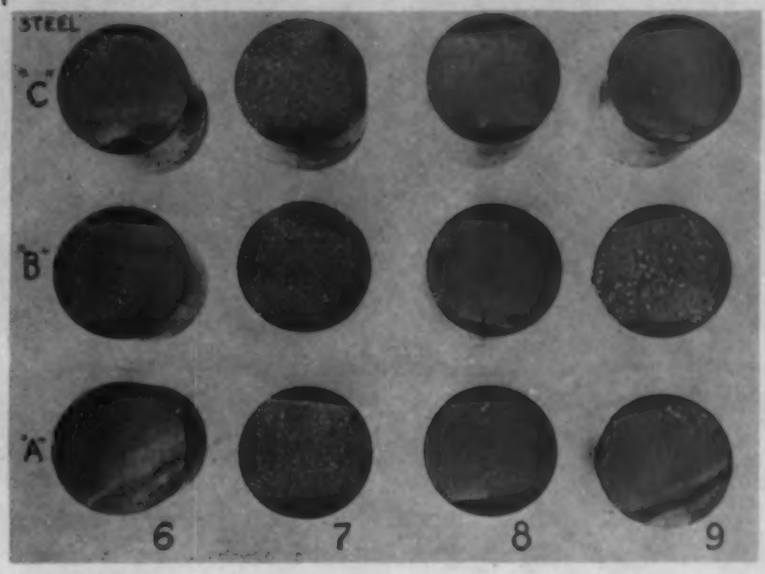


Fig. 6—Fracture characteristics of the three steels when given a single normal heat treatment

Fig. 7—Fracture characteristics resulting from two successive heat treatments without anneal

Fig. 8—Fracture characteristics when hardened, fully annealed and rehardened

Fig. 9—Fracture characteristics when stress relieved between the two hardening treatments. Note elimination of fish-scale on steels A and C but not on B

TABLE I—Distortion Test

Steel	Four Sides Machined ($\frac{1}{32}$" off each side)	Three Sides Machined (One side bar surface)
A	0.001/0.0015" out of straight	0.007/0.008" out of straight
B	0.001/0.0015" out of straight	0.004/0.005" out of straight
C	0.0005/0.001" out of straight	0.006/0.007" out of straight

TABLE II—Salt Bath Heat Treatment—Surface Carbon Analyses

	——Salt Bath Type No. 1——				——Salt Bath Type No.2——			
	Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4
Steel A	.93	.87	.84	.83	.96	.85	.82	.83
(Orig. Carbon 0.82)	.89	.85	.84	.82	.87	.85	.82	.81
(Orig. Carbon 0.82)	.93	.87	.84	.83	.93	.86	.84	.83
Steel B	.78	.75	.73	.72	.85	.78	.77	.74
(Orig. Carbon 0.72)	.79	.74	.73	.73	.81	.75	.72	.72
(Orig. Carbon 0.72)	.78	.74	.72	.72	.81	.79	.76	.73
Steel C	.89	.84	.82	.82	.94	.87	.83	.82
(Orig. Carbon 0.82)	.88	.84	.82	.82	.89	.85	.84	.82
(Orig. Carbon 0.82)	.90	.88	.86	.83	.91	.88	.84	.83

TYPE 1 SALT BATH—Essentially barium chloride.
TYPE 2 SALT BATH—Borax and boric acid.
HEAT TREATMENTS:
Steels A and C ..... Oil Treated 2200° F.
Steel B ..... Oil Treated 2350° F.
Steps of 0.010-inch on the diameter after lead annealing at 1400 degrees Fahr.

TABLE III—Fracture Characteristics and Intercept Grain Count

	Treatment 1		Treatment 2		Treatment 3		Treatment 4	
	Frac. No.	Grain Count	Frac. No.	Grain Count	Frac. No.	Grain Count	Frac. No.	Grain Count
Steel A	9¼	11.2	F.S.	3.0	9¼	11.1	9¼	10.9
Steel B	9	10.7	F.S.	1.6	9¼	11.4	F.S.	4.4
Steel C	9	10.2	F.S.	2.8	9	10.2	9	9.8

Notes: F.S. means fish scale, could not be compared to the standard fractures.

Treatment 1:	Steels A, C	Oil treated 2200° F.
	Steel B	Oil treated 2350° F.
Treatment 2:	Steels A, C	Oil treated 2200° F., followed by re-oil treating from 2225° F.
	Steel B	Oil treated 2350° F., followed by re-oil treating 2375° F.
Treatment 3:	Steels A, C	Oil treated 2200° F., annealed 1580/1600° F. followed by re-oil treating from 2225° F.
	Steel B	Oil treated 2350° F., annealed 1580/1600° F., re-oil treated 2375° F.
Treatment 4:	Steels A, C	Oil treated 2200° F., stress relieved 1440° F., 8 hrs. at heat, furnace cooled, re-oil treated 2225° F.
	Steel B	Oil treated 2350° F., stress relieved 1440° F., 8 hrs. at heat, furnace cooled, re-oil treated 2375° F.

Industrial "Know-How"

(*Continued from Page* 83)

the body of the commutator or shaft when dip-soldering leads of small generator rotors into the slots of the commutator segments.

The sleeve is welded from thin sheet steel. A piece of ¼-inch standard pipe welded into the side near the bottom and extending upward so it will protrude when the commutator is submerged in the solder serves as a vent for the sleeve. The sleeve is made with a slide fit and covers the shaft end along with about three quarters of the commutator body. The joint between the sleeve and commutator body is taped to prevent entrance of molten solder. After the soldering operation, the sleeve may be easily removed with asbestos gloves.

Life of solid stacking arbors for alignment of punchings during assembly of stators of small instrument-type motors was found to be short because of wear caused by pushing 0.010-inch silicon steel laminations over surfaces precision ground to very close tolerances. Further, the punchings were stacked on an eight-degree spiral and as a result three lands 0.025-inch wide extending into the slots had to be machined in the arbor. As these lands wore thin, an uneven saw-toothed slot often resulted.

As shown in Fig. 4, the difficulty was overcome by machining the body of the arbor undersize and milling out slots ⅜-inch wide and using high carbon spring-steel lands. These are held in place by keys attached to the arbor by flat-head screws and ground to correct bore tolerance when assembled. Lands and keys are replaced when wear becomes apparent.

Die Holder: A new holder for split dies, Fig. 9, eliminates the tool steel wedges formerly required to fix dies in the holder and assures a tighter grip. As shown in the illustration, the new method employs counter-sunk setscrews located in the shoulder of the die holder set at an angle of approximately 20 degrees thus exerting a sidewise and slightly downward pressure. The die must be flared out somewhat at the bottom with the die holder proportionately recessed to receive it.

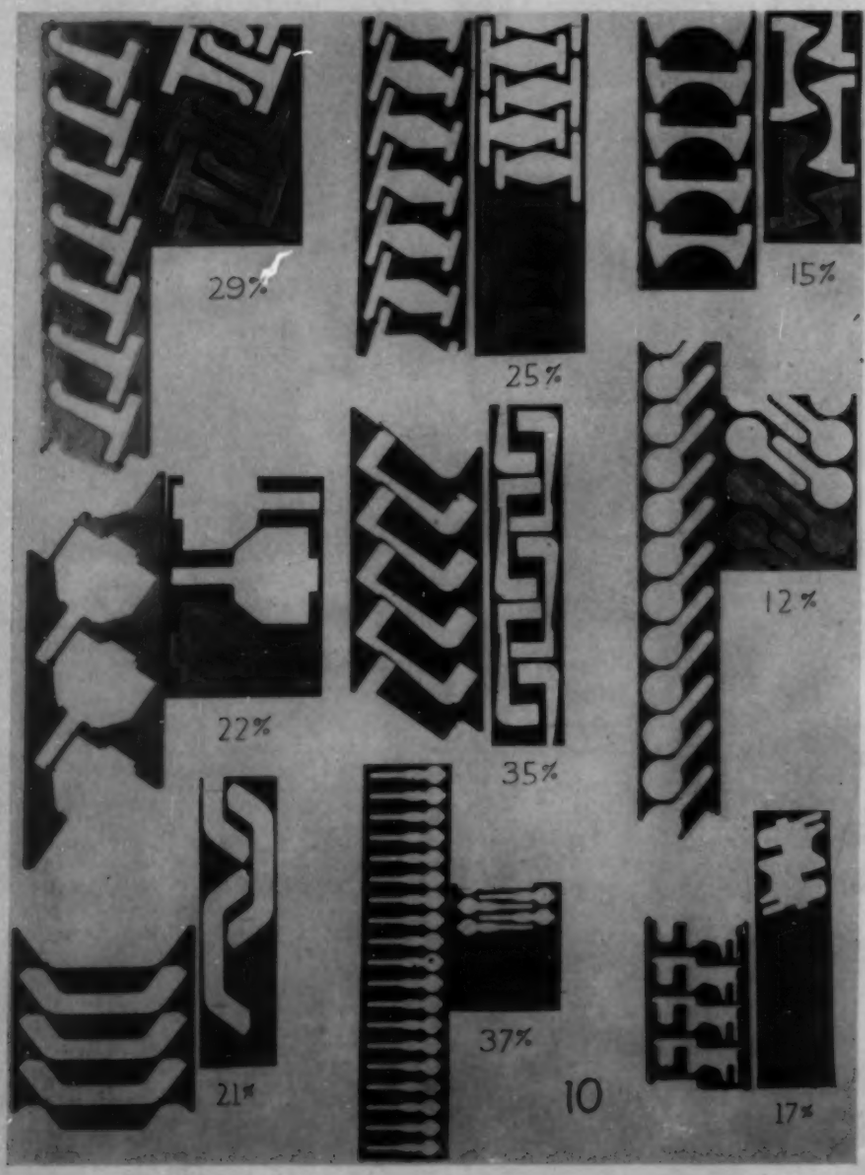
Checking Groove Diameters: For checking shaft diameters when undercut close to shoulders on shafts, it was found that the operation could be expedited by adding a slender blade and lifting lever to the plunger of an indicating instrument and a similar slender blade projecting up from the base holding the gage. The thin blades readily enter the groove and afford an accurate reading of diameter at base of groove. This arrangement proved so satisfactory that the application was extended to checking both diameters and out-of-roundness of many types of shafts having a series of different diameters. Snap gages were used previously.

Holding Machine Work: General Electric has replaced the conventional U-clamp for holding work on machine tables with the positive clamp illustrated in Fig. 3. A hardened steel insert in the under side of the upper member of the clamp prevents slipping. The T-bolt is fitted with a coupling nut which extends the range of work thicknesses by varying the effective length of the stud, permitting various lengths of studs to be used. This scheme prevents excessive length of stud projecting up above the clamp, thus avoiding any interference with the work area. The fixture is being used on boring mills, planers and milling machines to advantage.

Reaming Bearing Housings: Production of an important ordnance item has been stepped up through the development of a tool for quickly and accurately reaming holes in ball-bearing housings. The reamer has proved absolutely reliable in the hands of unskilled workmen. Holes bored 0.001 to 0.002-inch under size are finished to a tolerance of between 0.0002 and 0.0003-inch.

The tool is essentially an expansion reamer designed for a cut of 0.0005-inch per turn. It is provided with a micrometer setting adjustment with 50 equal divisions on the index dial. In setting up for production, the tool first is reduced in diameter and inserted into the bore of a trial piece. Then it is expanded and the proper index number on the dial is established for the finished tolerance. The reamer then is ready for production work. GE uses sizes ranging from ½ to 6½ inches in diameter.

Fixture for Bearings: A fixture, Fig. 6, for holding split-type ball seat bearings during machining operations has three parts, the first of which has ta-



then I said to myself—

So . . . the Nazis couldn't sink her!

This 12,500-ton, all-welded tanker "Victoria" was torpedoed amidships. Her deck plates buckled but her bulkheads held. Then, the baffled Nazis smashed a second torpedo into her and left, confident she was finished. But those welds refused to yield—even to Nazi TNT. She made it to port and was repaired—ready for the subs again. Some ship, I say!

Some construction, you mean! This is just one of many welded ships that have refused to be licked by torpedoes. Just like our welded M-4 tanks which withstood the Nazi 88's in North Africa. Ships, tanks, planes and guns—they're all welded for strength as well as for savings in time and materials.

Better products and *lower costs*—just what I want in my business after the war. Then why shouldn't I weld my peace-time products?

You should! You MUST if you plan to survive in the face of war-developed ideas. And believe me, your ship of business will sink or float, depending on how well you can stand up against competition on WELDING ECONOMY. Why not start NOW to learn from Lincoln the latest kinks in welding thrift.

THE LINCOLN ELECTRIC COMPANY, CLEVELAND, OHIO

pered shank to fit the lathe spindle and a ball seat to receive the bearing. Its outside diameter is threaded to take part two, a holding nut. Part three is a center which fits the tailstock.

In setting up, the tapered shank of the fixture is slid into the lathe head and the bearing placed in the ball seat fit. The holding nut then is turned on by hand. Next, the flanged center is placed in the tailstock and tightened against the face of the bearing so that it is absolutely square with the machine. The holding nut then is tightened with a wrench, the tailstock pushed out of the way and the part is in position for boring. Previously, these bearings were held by the four-jawed chuck of the lathe. Adjustments were made by tightening the jaws of the chuck with the possibility of springing the bearing.

Aligning Keyways: Another fixture, shown in Fig. 1, has proved useful in overcoming the problem of misalignment in cutting keyways in a cam shaft 3 inches in diameter and 6 feet long. It also permits use of a small machine for a job ordinarily requiring use of a spliner.

The angle-iron fixture is planed on four surfaces and has clamps for holding the shaft in place in the angle. Two keyways are cut and then the shaft and fixture are moved along in the V-blocks to the next setting. With the work performed while the shaft is held in the fixture, the keyways remain in line. Previously, it was impossible to machine a series of keyways without some subsequent correction since only two could be cut with one setup.

CAN YOU HELP?

The Ordnance Board (Superintendent of Applied Ballistics, Col. A. H. Phillips) in England is urgently in need of an Amsler No. 4 planimeter. Anyone knowing where such an instrument may be purchased (new or used) is asked to notify Brigadier K. S. Mackenzie, deputy inspector general and director, Technical Services, Inspection Board, United Kingdom and Canada, 1705 "L" Street, Washington.

Shielded Screwdriver Bit: It has been found that small assembly operations in which fillister or round head screws are used can be facilitated by use of shielded screwdriver bit. A standard straight screwdriver bit is used and the shield consists of a thin bushing pressed over the bit to completely cover the working surface of the screwdriver. The arrangement keeps the screwdriver centered on the screw and largely eliminates possibility of burring the slot or slipping.

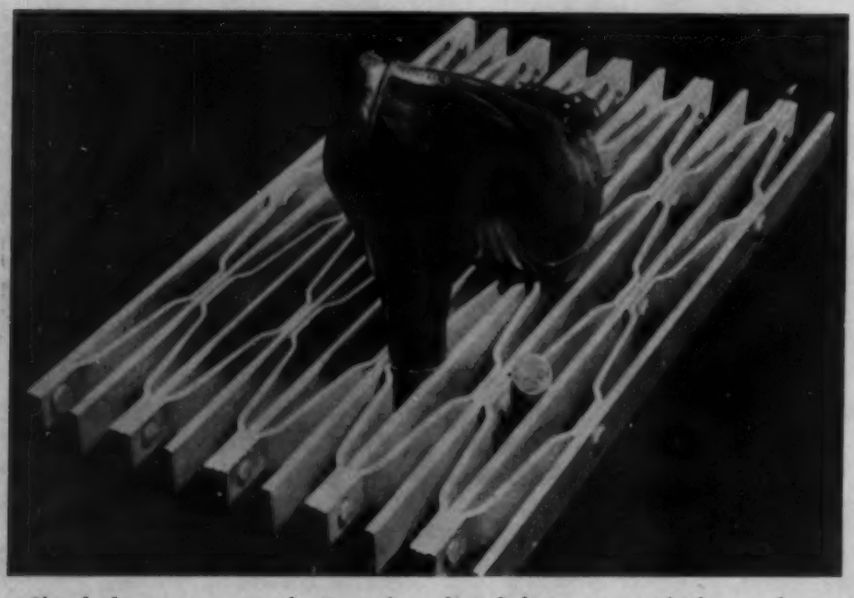
Center-Stop Stud: A new method for making a center stop brass stud has resulted in a 46 per cent saving in brass and a 13 per cent net saving when considering both material and labor. The stud previously was turned from 5/16-inch hexagon bar stock with the necessary material left in the center to form the stop. The shank was threaded on a hand screw machine. The stud now is formed by slightly upsetting the center portion on a cold-header. This then acts as a "stop" for a hexagonal nut which is made separately. After threads are rolled on the stud the nut is turned up against the center stop to form the completed stud.

Metal Spraying: A simple expedient has resulted in a vast saving in time and material when metal spraying small magnet inserts with aluminum. The inserts previously were placed in a wooden rack and sprayed individually, an operator turning out 1000 per day. With the use of a small motor-driven tumbling barrel, the same operator is spraying 1000 inserts every 12 minutes. Aluminum consumption has been cut from 375 pounds for 60,000 pieces to only 10 or 12 pounds.

Scribing Rings: A layout tool devised to simplify scribing a metal packing ring for cutting into six segments may easily be adopted for other jobs. The tool, illustrated in Fig. 7, has two arms at a 60-degree angle since the rings are to be cut into six segments. It has a maximum radius of 18 inches which permits ring diameters from 9 to 31 inches to be laid out. Each arm is marked with a scale in ¼-inch graduations to correspond with the various outside diameters of the rings handled. The arms are slotted and a movable clamp can be set and locked at the desired position along each arm.

In using the tool, it is only necessary to measure the outside diameter of the ring to be cut and then set the clamps at the corresponding measurement marked on each arm. The operator then scribes a ring along the outer edge of each arm and, using each line scribed as a guide for the next one, complete the layout.

A STEEL GRATING THAT "STOPS" DIMES



Slated for postwar production, the steel grating shown above, designed by Irving Grating Co., Long Island City, N. Y., is reported to be ideal for use especially in front of store windows. Feature of the design is spacing of the bars. The grating has a spacing of ¾-inch between straight bars and maximum opening of ⅝-inch between crimped and straight bars—as shown—an opening less than the width of a dime.

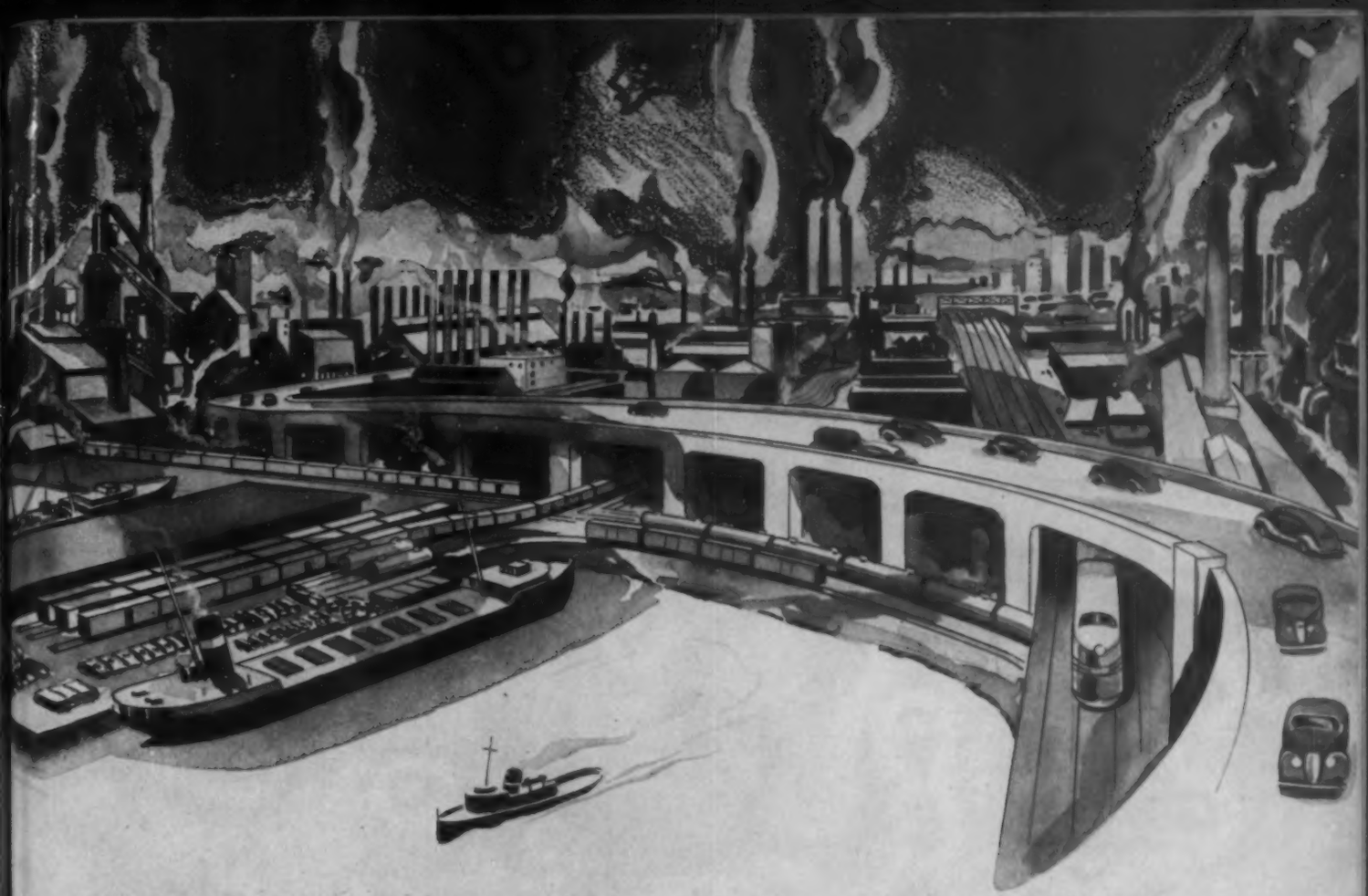
In addition, the grating removes the heel hazard for women.

Great Lakes Red Book For 1943 Now Ready

Great Lakes Red Book, paper, 160 pages, 3 x 4¾ inches; published by Penton Publishing Co., 1213 West Third street, Cleveland, for $1.

The 1943 issue of this annual publication contains a list of over 1500 vessels of the Great Lakes, with names of their owners, captains and engineers and of shipbuilding and ship repair yards.

In addition it is a complete port directory, complete shipyard directory and presents dimensions and capacity of all bulk freighters. Indexing is such that reference is easy and information as to vessels and personnel is readily reached. This is the recognized authority on Great Lakes fleets.



Take a Good Look at Industrial America

HERE is a picture of American industry on the march. Smoke pouring from thousands of factory stacks symbolizes the determination of American workers to keep Army and Navy cannon smoking until victory is won!

Study this picture of our industrial front. It is a view of cooperation that spells certain defeat of the Axis. This picture is a challenge to every Sterling worker, because grinding wheels are being used in every plant. Eliminate grinding wheels and a lot of those stacks would stop smoking . . . reason enough why Sterling men and women are working night and day to serve you!

Every plant in America has different grinding problems which the "Wheels of Industry" can solve. Billet grinding, casting cleaning, tool room grinding, saw gumming—there are thousands of uses for grinding wheels and every one is different—and important!

To meet the growing demands for our products, Sterling is rapidly expanding its facilities. We are adding experienced engineers to our already large staff. We are enlarging our plant. Our laboratories are creating new ideas that are helping push up production and making industry's task easier. We, too, are on the march.

Your unusual assignments can be speeded up by using correct Sterling Grinding Wheels for your jobs. Sterling engineers will gladly advise you. Often a sizeable speed-up is possible when wheels are built to exact specifications. We are ready to help . . . may we?

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THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

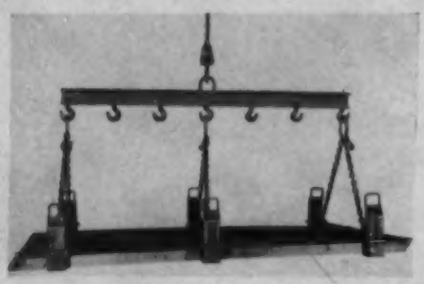
THE WHEELS OF INDUSTRY

INDUSTRIAL EQUIPMENT

Steel Grab

Palmer-Shile Co., 796 South Harrington avenue, Detroit, is offering a new sheet-steel grab for handling short, average-size, or long flexible bundles of sheet steel without slippage or distortion of stock.

One of these grabs is used for short



bundles; two grabs hooked to a supporting beam for medium bundles; three grabs for longer bundles. Supporting beam as shown here is six feet long.

Lifting capacity of the grab ranges up to 3 tons. Sizes of bundles may vary from 18 to 48 inches in width; from 0 to 9 inches in thickness; and up to any length. A grab hook takes up slack in chain when low head room is required.

Atmosphere Indicator

Claud S. Gordon Co., Chicago, is offering a new furnace atmosphere indicator, operation of which is based on the thermal conductivity method of analysis.

Developed and being manufactured by the Weaver Mfg. Co., Springfield, Ill., the instrument is in continuous operation during the entire heating cycle, enabling

the operator to detect any atmosphere change of consequence which may take place due to variations in the gas supply. The importance of this point is pointed out because city and mixed gases vary from time to time, as do atmospheres produced in some generators.

Semi-Automatic Machine

Snyder Tool & Engineering Co., 3400 East Lafayette street, Detroit, is offering a new semi-automatic machine for weighing and balance-milling connecting rods. It incorporates several features which mark a decided advance over previous methods commonly used.

For the purpose of this operation, a

small amount of excess stock is left on each end of the forging and by milling into this metal, excess weight is accurately removed. Workpiece is first weighed and the amount of excess stock on each end determined by means of a double dial shadowgraph scale. The piece is then clamped in the fixture manually and by turning a hand wheel, the operator advances a finder which locates the excess metal on the connecting rod and immediately flashes on a green tell-tale light. This operation automatically brings the cutting tool into alignment with the tip of the finder. Should the operator turn the wheel too far, a red light flashes on and stays on until the wheel is reversed to bring the tool back into alignment.

The operator then sets the pointer on the fan-shaped dial (above the milling unit) at the amount of excess stock which the scale indicated must be removed and this sets the cutter in position to remove that amount of stock. When these settings are made for each end of the connecting rod, an electric push button is pressed and both units feed cutters past the work, removing the excess stock and bring the rod to correct balanced weight within the usual quarter-ounce limit.

The machine is designed for handling one connecting rod, and the distance between centers in the large and small pin holes is fixed. However, by providing suitable adjustors on the scale and fixture, two or more connecting rods of various lengths and weights can be balance milled.

Safety Goggle

American Optical Co., Southbridge, Mass., recently introduced a new Ful-Vue safety goggle with 6.00 curve clear Super Armorplate lenses for women workers. Specifically designed to fit the smaller features of women, the goggle is made in 42 millimeter eye sizes.

Three bridge sizes are available: 19, 21 and 23 millimeter. Besides protective features the goggles have earpieces with perspiration-proof insulation.

No metal touches the skin. Lenses are deeply curved for extra strength, and are of the highest quality ophthalmic crown glass, optically ground and polished, it is said.

Arc Welders

Welder Division, Harnischfeger Corp., Milwaukee, announces the addition of 7 heavy-duty and 4 intermittent-duty industrial model alternating-current arc welders to its line, featuring 20 to 1200 ampere welding service range. The new line includes the recently adopted "WSR" (Welding Service Range) ratings which show the actual minimum to maximum output of usable welding current.

Specific "WSR" ratings of heavy-duty

models are: 50 to 270 amperes, 60 to 375, 90 to 500, 100 to 625, 125 to 750, 150 to 900, and 200 to 1200—of intermittent-duty models: 20 to 185 amperes, 20 to 235, 20 to 285, and 20 to 335.

Setting and control of current throughout complete welding service range involves one simple adjustment. According to company engineers, the models have shown an increase in operating efficiency up to as high as 95 per cent with appreciably reduced maintenance cost.

Scotch Tape Printer

York Electric & Machine Co., 1241 West King street, York, Pa., now is offering a new machine especially designed to print standard "Scotch" tape in a manner which makes it impervious to gasoline and oil.

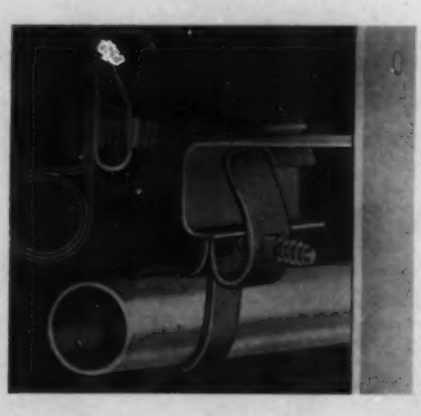
Printed surface is guarded against friction, and cannot be scraped or rubbed off, it is said. With this equipment, new codes may be set up within a few minutes. The machine is being used, in many cases, for marking parts and other shipments being sent to our allies so parts may be identified whether or not they are in contact with salt water etc.

Printing on the tape is on the under or sticky side of the transparent tape. The tape is backed up by another tape—of opaque type—thus hermetically sealing the printing.

Nut for Piping

Tinnerman Products Inc., 2039 Fulton road, Cleveland, announces a new Speed nut for expediting the assembly of conduit, piping and wire harnesses in aircraft. Referred to as the No. 6337, it is of special aircraft spring steel with a zinc metal spray finish.

The nut is designed to snap quickly around rolled sections or stringers and eliminates the need of drilling holes which weaken the structure. As the screw in the Speed nut is tightened the two legs are

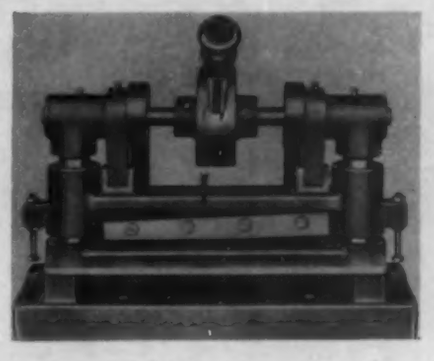


forced inward to give a firm spring tension grip. The nut is for use on various sizes of "Z" stringers. For beaded extrusions the company is offering a similar nut known as the No. 6320.

Improved Shear

O'Neil-Irwin Mfg. Co., Minneapolis, announces an improved model of its Di-Arco shear No. 2. Improvements include increased net weight, and extended mechanical strength limits, providing greater rigidity, stability, ease of operation and higher material output.

The shear, described in STEEL, Dec. 21, 1942 in the industrial equipment section, is suitable for precision work on light and medium weight metals and materials that cannot otherwise be rapidly worked to accurate tolerances, with a hand-operated "scissors" shear, or with a heavy foot operated floor-type shear. It has a maximum shearing width of 9



inches, handling 22-gage steel plate. Shear blades are reversible offering double service without resharpening.

Diamond Dressing Tool

Koebel Diamond Tool Co., 9456 Grinnell, Detroit, announces a new diamond dressing tool reported to fit most standard grinding machines. Called the Kodi, it is reported to do away with the necessity of a special dresser for each machine.

The tool is supplied initially with a special shank or Ko-Adaptor, fitted with a recessed head set screw which locks the standard Kodi nib in position. Once installed, the Ko-Adaptor remains on the machine. Only the Kodi nib is removed for re-setting or replacement.

Since one Kodi nib fits all Ko-Adaptors, the replacement supply need never be very large. Graduations, placed in a developed sequence to guide the operator, are an additional feature of the tool.

Inspector's Kit

Jas. H. Matthews & Co., 3942 Forbes street, Pittsburgh, is offering a new inspector's kit for use with S-22 synthetic stamps and acid etching inks. The kit is of acid proof, non-critical material, and holds four stamps.

Acid etching ink is kept in one bottle —oil or neutralizer in the other. A stamp pad is kept in the drawer shown at the front of the unit. Drawer is easily pulled out for re-inking pad by means of a glass tube provided.

In the marking operation, the inspector

chooses the desired stamp, tilts the self-closing cover on top of the kit, and inks the stamp by touching the pad underneath. After stamp is inked and withdrawn, the cover closes automatically and does not allow acid fumes to escape. After part has been marked by the inspector, he places a drop of oil or neutralizer from the second bottle on the marked impression thereby neutralizing the acid.

Aircraft Contactor

General Electric Co., Schenectady, N. Y., recently introduced a new contactor designed for aircraft applications where small size and lightweight are desirable. It is especially effective for controlling solenoids and small motors in aircraft.

The contactor is being furnished in two sizes—50 and 100 amperes. The 50-ampere type is 2 5/16 x 2 inches in size and weighs 4¾ ounces, and the 100-ampere type is 2¾ x 2⅝ inches and weighs 11 ounces.

Roll-Grinding Machine

Yoder Co., West Fifty-fifth and Walworth avenue, Cleveland, announces a new simplified roll-grinding machine which embodies only the necessary ad-

STEEL OF SPECIAL ACCURACY REQUIRED FOR

INTRICATE BATTLESHIP PARTS

Thomas Ship

OFFICIAL U S NAVY PHOTOGRAPH

Made of Thomas Cold Rolled Strip Steel, many small and intricate battleship parts have extreme accuracy. Fabricators of these items have long since learned to depend upon Thomastrip high quality, uniformity, and dependability. They know that their difficult specifications will be met dependably with Thomas' exacting production which includes unfaltering supervision. In addition to uncoated cold rolled strip steel, Thomas' special electro-coated products also speed many war production jobs and save non-ferrous metals.

Bright Finish Not Coated, Solder Coated, Electro-Coated With Nickel, Zinc, Copper, Brass . .

THE THOMAS STEEL CO. · WARREN, OHIO

justments necessary for roll grinding. It has a 16-inch diameter capacity.

The machine has a 20-inch length between centers with the table and cross feeds synchronized manually. Other features include a 2-speed table, 9-speed work head drive, dust protection, centralized controls and high-speed spindle. The unit is offered without belt or gear change.

Lighting Fixture

Sylvania Electric Products Inc., Ipswich, Mass., announces a new industrial type fluorescent lighting fixture which meets the latest material weight requirements of the War Production Board. Appearance of the new unit, it is said, testifies to its streamlined strength.

The non-metallic reflector of the fixture has a reflecting surface of Sylvania's own Miracoat. It is actually anchored to the top-housing with a pair of captive latches which release with a quarter turn

yet lock with a strength sufficient to support more than twenty times the weight called for. Chain hanging ears on 43-inch centers, ½-inch knockouts on 18, 24, 30 and 36-inch centers, channel for adjustable slide-grip hangers, and knockout for levolier pull chain switch make installation both speedy and economical.

Model HF-100R, using two 40-watt fluorescent lamps has an overall length of 49¾ inches, approximate overall width of 13 11/16 inches and overall height of 6¾ inches. Weight is 17 pounds. Total wattage including lamps and auxiliaries is 100 watts. Model HF-150R, with three 20-watt fluorescent lamps has an overall length of 49¾ inches, approximate overall width of 13 11/17 inches and overall height of 6¾ inches. Total wattage including lamps and auxiliaries is 150 watts. Model HF-235R, using two 100-watt fluorescent lamps has an overall length of 61½ inches, approximate overall width of 16¾ inches and overall height of 8 inches. Total wattage including lamps and auxiliaries is 235 watts.

Gearmotors

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new line of horizontal parallel shaft type gearmotors for speed reduction requirements over a range of 1.75 horsepower.

Each unit, it is said, conforms to A.G.M.A. standard output speeds and application practices.

Use of adaptor castings between motor and mechanical parts allows the use of all standard Westinghouse frame motors with each type of unit, and types of motor construction can therefore be readily changed to suit varying service conditions.

The design of the motor-adaptor assembly being common between unit types, such assembly can be readily shifted between unit types to meet changes in speed requirements.

Gears and pinions in the new gearmotors are of 0.40 to 0.50 carbon steel, and are given special heat-treatment before hobbing. Gears and bearings are lubricated by a positive splash system, and new case design allows oil to circulate freely at all times.

Idling Device

Universal Power Corp., 4317 Euclid avenue, Cleveland, announces an improved electro vacuum type gasoline engine slow-down device for gasoline engine driven welders. It enables welders

to be run at an adjustable reduced speed until the arc is struck. Then, at this point, the engine comes to full speed, dropping back to reduced speed when welding stops. Idling speed is changed by adjusting a screw. This permits altering the time engine will run after the welding arc is broken.

Surface Grinders

Hill Acme Co., Cleveland, announces a revamped line of hydraulic precision surface grinders in both horizontal spindle and vertical spindle design. These are reported to be ideal for either special purpose grinding or for production operation.

In improving the line of grinders, controls were all grouped in one location to facilitate ease of operation. In addition, the motor of each machine was mounted on the column to improve the balance of the unit, and to provide smooth operation.

Main drive motor of the open side grinder is built integral with a dynamically balanced spindle. Its reciprocating

check these short cuts
3-M ABRASIVE SPECIALTY ITEMS
aid in Speeding up War Production
Elek-Tro-Cut Three-M-ite Cloth Tapered Cartridge Rolls.
Elek-Tro-Cut Three-M-ite Cloth Slotted Discs.
Overlap-Slotted Elek-Tro-Cut Three-M-ite Cloth Discs.
Three-M-ite Cloth Cones.
Three-M-ite Cloth Even-run Bonds.
Elek - Tro - Cut Three-M-ite Cloth Spiral Wound Strips.
Elek-Tro-Cut Three-M-ite Cloth Cartridge Rolls.
Deburring jobs and finishing hard-to-get-at areas can be done in a fraction of required time when you use one of the 3-M Abrasive Items made specially to reach these areas.
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ENGINEERED DUST CONTROL on the home front is as essential to Victory as *air control* on the war front, for the battles of production—like battles between armies—are more easily won after mastery of the air is achieved.

In many of America's fast producing industrial plants, American Air Filter equipment is protecting materials in process, reducing rejects, increasing worker efficiency and lowering maintenance costs. If you have a troublesome or dangerous dust condition in your plant, write us about your problem.

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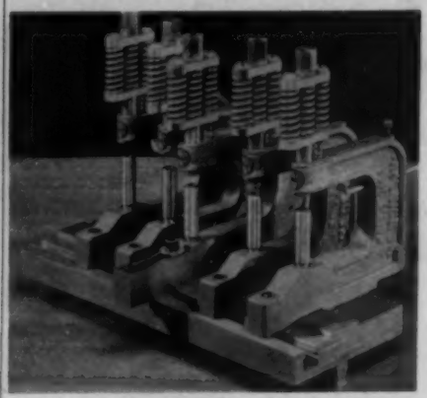
table drive is 100 per cent hydraulic, operating on low pressure with instantly variable table speeds of from 10 to 100 feet per minute. Rapid traverse is provided for raising and lowering wheelhead with hand controls for final adjustments.

On the horizontal spindle grinder the cross feed is also hydraulic. It can be set for a constant feed or adjusted for jump feed at each reversal of the table. Its spindle head likewise can be manually operated, or locked in place for form or contour grinding. A system of double pumps provides separate and independent operation of the table and cross feed, and permits dressing of the wheel by power.

On the vertical spindle grinder provision is made for tilting the head in order to grind concaves within the maximum periphery of a 26-inch segmental grinding wheel. All machines are offered with standard table sizes of 18, 24 and 30 inches, and 5 to 20 feet long.

Hole Punching Unit

Wales-Strippit Corp., North Tonawanda, N. Y., is offering a new type CA hole punching unit with built-in adjustable adapter which provides an adjustment up to 1½ inches front to back for "off-center" or staggered hole patterns



when used in setups on press brakes.

By designing the punch and die into the same independent holder, it is possible, with a master pattern as guide, to locate hole punching units in exact position by simply sliding the units along the rail. In cases where holes are located off a straight line pattern, the units can be moved front to back on this new adapter and locked in position.

Nothing is attached to the ram of the press. The punch and die are held in alignment by the holder. The punches and dies are removable for quick interchangeability. The three-spring "selective stripper" provides ample stripping pressure to strip any metal the punch will penetrate. Units are being offered to punch holes up to 5/16-inch diameter.

Three-Mile Conveyor

(*Concluded from Page* 98)

control analysis data for open-hearths No. 2 and 4. These are steelmaking units that have not been connected by tubes to the main laboratory. This system is worthy of special mention because of a variation in its method of operation. Rather than being operated solely by compression it is operated in part by vacuum or suction.

Due to the great length of open-hearth No. 2, it was found necessary to provide three sending stations for samples—one in the middle and one at either end of the floor. However, there is but one receiving station, and this is located at the middle of the floor, and is used only for the return of empty carriers. One blowing unit located at the laboratory supplies the power to send the containers both ways.

The blower is one integral part of the system, the input creating suction, while the output supplies compression. Containers laden with test specimens can be inserted at any one of the three sending stations in the open-hearth plant. This combination of compression and suction is employed to obviate the need of additional conveyor lines and blowers. The alternative would be three conveyor lines, or one between each of the three sending stations at the open hearth with a blower at each end, or a total of six blowers. The sending line that operates on suction measures 2800 feet from the laboratory to its third or furthest removed station. The line on which containers are returned to the open hearth by compression measures 2500 feet.

Another shorter line from this laboratory to open-hearth No. 4 likewise utilizes both compression and suction. In this instance, however, since the total length of the line is only 630 feet the same line is used both for transmitting and returning containers. Suction is used to convey samples to the laboratory as in the other line. When containers are to be returned the blower motor is simply reversed, creating compression to blow them back.

Moves Blast Furnace

(*Continued from Page* 100)

anticipate the material replacement requirements and to scour the country for used equipment, materials and supplies so that the rehabilitation program could proceed both without delay and without using critical materials. In addition to the repairs carried out under the ore bridge, an electric overhead crane was erected in the power house, and after the power equipment, that had been sabotaged during the many years of the plant's idleness, had been removed the floor was

ROEBLING Wires
ROUND . . . FLAT . . . SHAPED
A FEW WIRES TYPICAL OF ROEBLING'S BROAD SPECIALTY PRODUCTION
ROUND WIRE TO SPECIFICATIONS
SHAPED WIRES
HIGH CARBON FLAT WIRE—.0015" THIN!
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Ready Made
ANSWERS TO YOUR PROBLEMS!

THE ROEBLING high carbon flat wire shown here is rolled to .0015! The applications it will serve are off the record—but you can be certain that in tolerance, temper, and finish, it will serve them well.

This is but one of hundreds of wires Roebling has produced to meet super-special requirements. Your own Victory product might not require this particular Roebling specialty. But rest assured that Roebling can give you whatever you need in wire—whether it's a standard grade or is one of those unusual products that demand special processing all down the line! Analysis, dimensions, finish . . . all will be met with *exactness!* Prompt action on war orders.

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filled up with various machine shop tools, where all of the valves, fittings and other furnace mechanisms were torn down, repaired and rebuilt and reassembled for shipment to Mexico.

Much of the remainder of the new Mexican steel plant is also constructed of salvaged materials, such as buildings, boilers, turbogenerators, and even the plate mill, the largest contributor probably being the Youngstown Sheet & Tube Co., Youngstown, O.

When the final story of victory is written, it will likely point out that the extra "lift," giving us the overwhelming balance of production, was a direct result of salvaging, conserving, adapting and rehabilitating the obsolete and abandoned facilities that under normal conditions would have fallen under the wrecker's hammer. Equally important is the willingness of industrialists to put production above consideration of postwar problems.

Flame Cutting

(*Continued from Page* 103)

in Fig. 11 where long beveled cuts or irregular cuts on pipes, box sections or channels are involved require considerable study on the part of the templet maker as well as considerable skill on the part of the flame cutter who uses it to mark out the work, not to actually guide his torch as was done by the type of templet shown in Fig. 10.

Such cuts on parts as are shown in Fig. 11 can be marked out from templets made of heavy cardboard or a metal templet in the case of a more permanent fixture for a greater production item. Such a templet may be wrapped around the part in laying out the cut. Careful study must be made of the compensation for the width of the soap stone or other marking material which is used in drawing around such templets. Also, care must be used in marking with such templets, for if they are cardboard it is easy to wear down the side of the templet or to ravel it and thereby cause a change in dimensions.

Repositioning Should be Avoided

Whenever possible, the templet used should either fold completely around the member, or at least (in the case of box sections or channels) lie on three sides of it so the templet does not have to be moved and repositioned on the part during the laying out process. It is very easy to make small errors in repositioning and matching up a templet to finish a layout job on a channel or box if it is not done in one operation. Fig. 10 shows how a straight-edge should be used to make such cuts as shown in Fig. 11.

An important factor in making templets for cutting such shapes as channels

and boxbeams is careful indication on the templet as to just where the cut shall be made with reference to the removal of portions of the web. Great skill and considerable care are required to make parts such as those shown in Fig. 13.

The trick at this point is to see that when they are heated and bent, the webs will join properly for a weld.

Good Templets Make Good Cuts

The responsibility for making these joints fit correctly lies heavy on the maker of the templets. If the templet is made properly, it will show exactly where the cuts are to be made. If such a templet is used, then it is up to the operator who lays out and who makes the flame cut to follow the lines faithfully and to visualize correctly the way in which the part is going to be bent to make the fit.

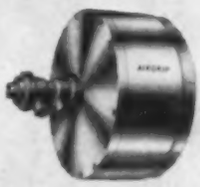
The production of flame-cut parts is a process that requires considerable care on the part of the flame cutter himself. Skill must be exercised all the way through the process. Positioning of the part on the machine, or on the stand on which it will be cut must be so the work will be level, will be accessible to the flame and will not be impeded by whatever the part is resting upon when the flame cuts through. Work should be level so the kerf will be square, rather than slightly beveled.

Inspection: It has been found very effective to have a member of the inspection department, (or some other member of the organization) designated to study the fit-up of parts and to work with the cutting department or the engineering department to find out the cause when parts do not fit. Often it will be found that when parts consistently fail to fit, there will be something wrong with a templet or with the cutting department's handling of that templet.

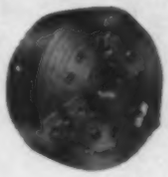
If, however, a portion of an order of parts is found not to fit and others in the same lot fit properly, a mistake in the handling of the templet is indicated. This may be either in laying out the part or in the cutter's manipulation of the cutting equipment. Where only a portion of the parts on an order do not fit, it is usually a matter of educating the cutting department and the cutter involved. However, if all of the parts on an order fail to fit in the same degree, then correction of the templet is definitely indicated. It often pays very big dividends.

To have a single man responsible for checkups of fits forms an effective way of checking from the fabrication department back to the source of the workmanship which controls the fit-up later on.

Install "Airgrip" Holding Devices



"Airgrip" Revolving Air Cylinder—rugged and powerful.



"Airgrip" Three Jaw Universal Chuck—heavier cuts and coarser feeds.

"Airgrip" Collet Chuck—precision-built for mass production.

Maybe you have been thinking in terms of muscle when faced by the manpower shortage. Well, you can forget it, because when you install "Airgrip" Holding Devices any average American girl can *step up your output 25%, or more*—and keep up that pace all day long without undue fatigue.

Take the time now to investigate the advantages of "Airgrip" Holding Devices—more production, lower cost, reduced spoilage, minimum operator fatigue—and far less worry about the manpower shortage.

"Airgrip" Devices are available now—they are easy to install—and, "Airgrip" engineers are prepared to help you on any problems where air can be used for fixtures or chucking.

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Anker-Holth Mfg. Co.

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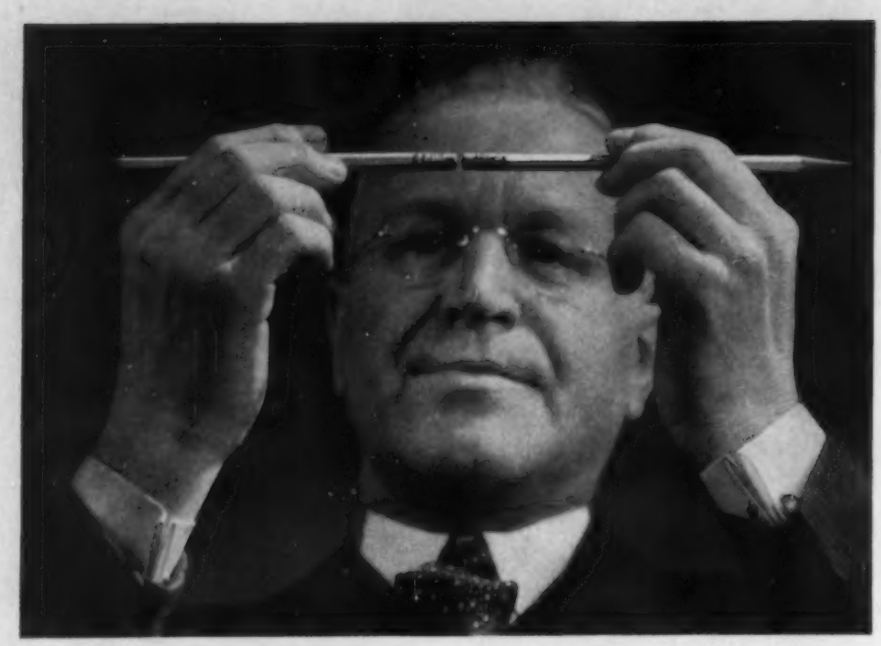

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Take a couple of pencils and try to hold them in perfect alignment without touching each other for 10 seconds and see what happens! It will give you a quick demonstration of the fact that it is impossible to maintain perfect alignment between the shafts of direct-connected machines.

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Ajax interlocking drive studs held by rubber bushed, graphited-bronze bearings assure maximum flexibility, quiet operation, and complete elimination of lubrication problems.

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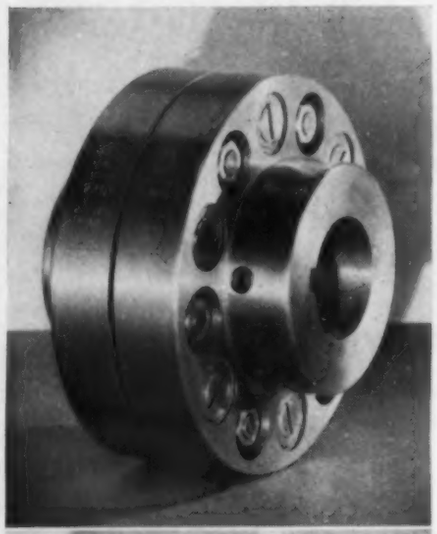

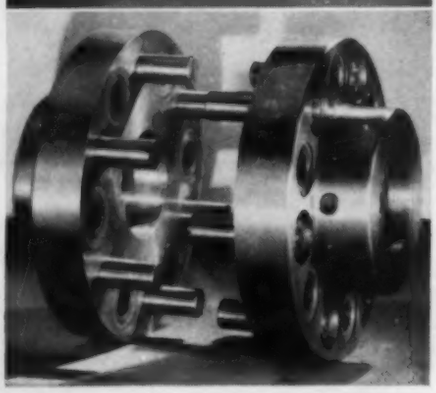

AJAX FLEXIBLE COUPLING CO.

Incorporated 1920 WESTFIELD, N. Y.

Heating High-Speed Tools

(Continued from Page 109)

or corners to scale away during heating. Steel A is similar to steel B, and excellent results can be obtained if an atmosphere with 8 to 12 per cent carbon monoxide is employed.

Steel C is excellent as far as performance is concerned, although its heat treatment is more temperamental than either steel *B* or steel *A*, and it is impossible to heat treat this steel without a trace of decarburization if an ordinary furnace is used. The atmospheres producing the least decarburization are from 11 to 14 per cent carbon monoxide.

Methods of Heating: One of the more common ways for heat treating high-speed steels is the salt bath. Such units usually consist of three pots—one for preheating, the second for superheating and the third for quenching. Many tests on all three steels conducted in different types of salt baths in every instance show a clean surface, free from scale decarburization. Table II shows surface carbon analysis of the three steels after heat treating in two different types of salt baths.

Special atmosphere controlled furnaces whose atmospheres range from 23 to 32 per cent carbon monoxide with substantially no carbon dioxide have proved satisfactory for all three types of high-speed steel. Usually a slight amount of carburization results.

If an ordinary furnace is employed for the heat treatment of steel *C*, decarburization can be eliminated or greatly reduced by using carbon blocks or by coating with borax or copper oxide base compounds.

Quenching: Steel *B* can be air cooled in almost any size section with satisfactory hardness resulting. The molybdenum high-speed steels *A* and *C* are not quite so air hardening. Maximum hardness, however, can be obtained on air cooling if the cross sectional area of the tool is not over approximately 1-inch. Air cooling is often desirable since it reduces the danger of cracking.

A second method for quenching high-speed tools is to oil quench to near room temperature. This is the method most generally used.

A third method consists in heating tools to their normal superheating temperatures but instead of air cooling or oil quenching, the tools are immersed in a molten salt bath operated at 1000 to 1200 degrees Fahr. After cooled to this temperature, the tools are either oil quenched or air cooled to near room temperature. Air cooling is often preferred since it allows more uniform cooling.

A fourth method in common use simu-

lates the method just described. Here the steel is quenched into oil from the superheating temperature until it is practically black, then it is removed from the bath and allowed to air cool. During the oil quench it is necessary to get the tools below about 1200 degrees Fahr. It is safer to allow the tools to remain in the bath until they will not flash the oil. This combination of oil and air cooling has proved very useful, especially where intricate designs are being heat treated.

The advantages of both the third and fourth methods depend upon the fact that the austenite martensite transformation will be more uniform throughout the work as compared to oil quenching directly to room temperature. This is because the temperature gradient between the surface and the center of the tool is less than if quenched into oil down to room temperature. This reduction in temperature gradient will cut heat treating stresses greatly and consequently tends to eliminate cracking.

Tempering: High-speed steels are characterized by their ability to develop a secondary hardness in the temperature range of 900 to 1100 degrees Fahr. Steels *A* and *C* will show maximum secondary hardness when tempered from 1025 to 1050 degrees Fahr. with steel *B* requiring 1050 to 1075 degrees Fahr. Certain types of tools do not require maximum secondary hardness but demand high ductility. Such tools should be tempered at from 800 to 900 degrees Fahr. These are exceptional cases and many times some difficult high-speed jobs can be licked by using a lower drawing temperature than that giving maximum secondary hardness.

When it is necessary to straighten tools during heat treatment, it is strongly recommended that the tools be straightened in the quench and not during tempering. When high-speed steel is quenched and while it is in the temperature range of 600 to 1200 degrees Fahr., it is austenitic, therefore soft and ductile, having a hardness of about 300 brinell. Straightening is relatively easy in this condition. But when straightened at the tempering heat, the hardness will be around 550 brinell and more difficulty will be encountered. Also cracking and breaking may occur when straightening on the tempering heat.

In plants tempering steel in molten salts, these salts usually consist of a nitrate bath. If salt baths are employed for hardening, it is extremely important to determine whether the quenching salt contains any cyanide, for any cyanide must be thoroughly and completely removed before the tools are immersed into the nitrate tempering bath. Cyanide and nitrate salts produce a highly

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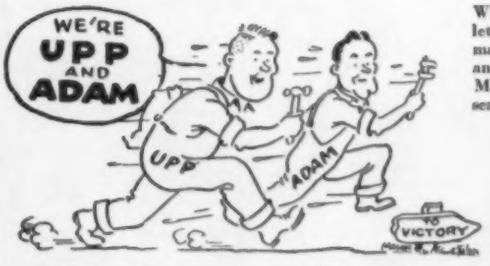

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explosive reaction when brought together at high temperatures.

Reclaiming Tools: It is often desirable to reclaim tools because some machining operation may have been overlooked, because of improper heat treatment on first hardening, or because of softening of the cutting edges due to improper grinding (tools with grinding checks cannot be reclaimed).

When reclaiming of tools involving heat treatment is discussed, one of the first thoughts is: "Will fish scale develop on the second heating operation?" If the tools are fully annealed between hardening operations and if the second hardening is done properly the danger of obtaining a fish-scale condition is eliminated. To show the effect of various heat treatments on the three types of high-speed steel under discussion, Figs. 6 through 9 are presented. These reveal fracture characteristics resulting from different combinations of heat treating.

Fig. 6 shows fracture characteristics of these three steels when given a single normal heat treatment; Fig. 7, when given two successive heat treatments without intermediate anneal. It will be observed that when any of the three steels are given successive heat treatments, a fish-scale fracture results.

In Fig. 8 are shown the fractures when the three steels are hardened, fully annealed and rehardened. Comparing the fractures of Fig. 8 with those in Fig. 6, observe that a full anneal between treatments completely eliminates fish-scale characteristics.

Fig. 9 reveals the fracture characteristics when the three steels were given a stress relief between the two hardening treatments. The stress relief was at 1440 degrees Fahr. for 8 hours. It should be observed that this treatment eliminated fish scale characteristics for steels *A* and *C*, but not in *B*.

As further confirmation, microphotographs are included to show the structure of these steels when using these heat-treating combinations. Fig. 5 illustrates the structure of the steel when given a single proper treatment and is typical of any high-speed steel in the as-hardened condition. Fig. 4 shows the structure of the steels when double treated and this is typical of all three steels when given two successful heat treatments without intermediate anneal. Fig. 3 represents the structure of all three steels when given a full anneal prior to a second hardening treatment. Notice here the same normal fineness of grain as in Fig. 5.

Fig. 2 reveals the structures of steels *A* and *C*, when stress relieved from 1440 degrees Fahr. and then rehardened. Fig. 1 shows steel *B* when stress relieved

Helpful Literature

1. Lathes

South Bend Lathe Works—48-page illustrated catalog No. 100-C describes complete line of engine lathes, toolroom lathes and turret lathes. Engine lathes are made in five sizes ranging from 9 to 16-inch swings. Toolroom lathes are available with swings from 10 to 16 inches. Turret lathes are made in two sizes, with 9 and 10-inch swings.

2. Conveyors

Alvey-Ferguson Co. — 6-page illustrated folder, "Conveyors That Are Helping Bring Victory Faster," shows typical installations of apron and roller, groove apron, concave roller, portable trough belt, overhead trolley, roller and combination roller-pusher conveyors in war industries. Details of ordnance handling equipment are explained.

3. Aftercooler & Separator

R. P. Adams Co.—4-page illustrated bulletin No. 702 is descriptive of pipeline aftercoolers and cyclone separators which effect reduction of temperature of compressed air to within 10 degrees of cooling water and remove condensed oil and water from air stream. Charts give data on specification and applications of this equipment.

4. Dust & Fume Control

Schmieg Industries—42-page illustrated booklet covers line of dust and fume control equipment, spray booths, mechanical washers and industrial ovens. Reproduction of blueprints give engineering details, capacities and dimensions of various units. Section is devoted to sheet metal equipment with built-in systems for removal of fumes or dust in welding, grinding, buffing and similar operations.

5. Oil Heaters

Ross Heater & Manufacturing Co.—16-page illustrated bulletin No. 3624-A is descriptive of type "O" straight tube heaters or preheaters and type "TS" tank suction heaters. The former are particularly designed for heating of fuel oils and similar viscous liquids for process work and preheating fuel oils for burners The latter are fabricated for instantaneous heating of heavy viscous fluids in storage tanks to permit pumping at higher temperatures.

6. Manganese Steel

American Brake Shoe Co., American Manganese Steel division—48-page illustrated bulletin No. 543-G shows how manganese steel is aiding industry to maintain uninterrupted operation. Use of this alloy steel is illustrated in conveyors, wheels, hoists, sheaves, chains, baffles, gears and other equipment. Company's X-ray facilities and metallurgical and testing laboratories are described.

7. Centrifugal Castings

Shenango-Penn Mold Co.—4-page illustrated bulletin No. 142 describes centrifugal castings meeting U. S. Naval requirements. Covered are propeller shaft sleeves up to 26 inches in diameter and 26 feet in length, stern tube bushings and small diameter products for applications such as pump and cylinder liners.

8. Testing Machines

American Machine & Metals, Inc., Riehle Testing Machine division—4-page illustrated folder is concerned with model 505 universal hydraulic testing machines. All sizes can be supplied as single purpose machines for either tension, compression or transverse testing. Safety features include automatic protection against overloading and over travel.

9. Coal

Roberts & Schaefer Co.—16-page illustrated bulletin No. 160 is entitled "How To Make Your Coal Worth More." It outlines seven case histories of how coal mine owners and operators found ways to make their coal more valuable. Covers such problems as dumping, conveying, sizing, cleaning, blending and loading coal.

10. Power Bits

Apex Machine & Tool Co.—12-page illustrated catalog No. 16 is descriptive of solid and insert bits with finders for slotted head screws. If standard bits cannot be used for certain operations, special bits can be furnished to suit job. Charts give specifications and sizes of standard power bits.

11. Metal Cutting Saws

Racine Tool and Machine Co.—4-page illustrated catalog No. 11-S discusses use of metal cutting saws for cutting shell, rifles, torpedo flasks, cannon and gun barrel forgings, and similar armament work. All saws are hydraulically fed and controlled. Saws have complete range of feeds for cutting all types of metals.

12. Zinc Coated Sheet Metal

American Rolling Mill Co.—36-page illustrated booklet is entitled "Useful Facts About Armco Zincgrip." Contains suggestions on specifying, ordering, fabricating and finishing this zinc-coated sheet metal. Metal will not peel or flake when it is severely formed. Special section is devoted to use of this metal in coils instead of sheets.

13. Forging Furnaces

Mahr Manufacturing Co.—15-page illustrated bulletin No. 210 covers entire line of forging furnaces with exception of rotary forging types. Eleven models are shown and specifications are listed. All sizes are standard and can be manufactured and shipped on order.

14. Zinc Plated Steel

American Nickeloid Co.—4-page illustrated folder contains facts about zinc plated steel sheets which are available in most gages and up to 36 x 96 inches in size. Sheets are available polished, unpolished, or satin on one or both sides. Zinc plating thickness can be varied to meet specific requirements. Steel can be bent, stamped, formed, drawn, soldered and spot welded to meet production needs.

15. Abrasive Wheels

Sterling Grinding Wheel division—6-page illustrated folder, "Surface Grinding with Sterling Chucks and Segments," covers abrasive materials, grain size, combination, grade, structure, bond and treatment specifications for "Sterbon" and "Sterlith" abrasive chucks and segments for surface grinder applications. Suggested wheel specifications for various materials and operations are listed.

16. V-Belt Sheaves

Worthington Pump & Machinery Corp.—16-page illustrated bulletin No. V-1400-B7C is descriptive of "Quick Detachable" sheaves which are available for driver and power driven units. Features are shown of these sheaves which are easy to mount and detach. Standardized dimensions are tabulated for hubs and rim combinations.

17. Spun Tube Products

Wolverine Tube division, Calumet & Hecla Consolidated Copper Co.—28-page illustrated brochure No. E-1 tells concise story of new process of tube spinning. Any product formed from tubing that requires end to be entirely closed, partially closed, tapered to small diameter or formed to any contour can be handled. Graphic comparisons are made between usual and new methods.

18. Blowers

L. J. Wing Mfg. Co.—8-page illustrated bulletin No. CO-5 describes single and two-stage axial flow blowers with "Voltrol" vanes. Fans are made in capacities as high as 50,000 cubic feet of air per minute and static pressures up to 12 inches of water. Capacity regulation is afforded by internal radial dampers actuated by external balanced lever. Blowers are particularly adaptable for forced draft applications.

19. Metal Forming Machines

Yoder Co.—12-page illustrated bulletin, "High Production Metal Forming Machinery," describes and gives specifications of rotary gang slitters and side trimmers, roll forming equipment, complete tube mills, special machinery, cut-off equipment, recoilers, uncoilers and coil boxes. Also shown are plate levellers, bending machines, flash trimmers and brass slitting line.

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20. Adjustable Draw Plates

Standard Machinery Co.—8-page illustrated catalog section TH shows types of work produced and describes various types of "Turks Heads" adjustable draw plates which are used for wire drawing into rectangular and special shapes. Both plain and universal types are described. Also covered are installations on rolling mills and draw benches. Friction and power driven tandem units are shown.

21. Power Panelboards

Square D Co.—12-page illustrated bulletin No. 250 covers "Saflex" power distribution panelboards which are designed to meet requirements of wartime industry for such equipment employing interchangeable switch units. Special panels may be built to government requirements. "Saflex" panelboards are dead front and approved by Underwriters' Laboratories, Inc.

22. Precision Work

Ace Manufacturing Corp.—8-page illustrated booklet, "Fine Precision Geared To Faster Production," describes company's precision grinding, production machining, metal stamping, heat treating, and tool and die work. Shows how manufacturer is producing for tolerances as close as 0.0001 inch, for finishes which speck of dust or warm hand distorts.

23. Heater & Ventilator

Young Radiator Co.—4-page illustrated catalog No. 2942 is descriptive of "Vertivent" heater and ventilator. Unit offers controlled ventilation and air tempering. Output can be automatically regulated to meet hour to hour requirements. Hood covering air intake prevents light leaks during blackouts and keeps out weather. System is well adapted to structures already erected.

24. Electric Hoists

Shepard Niles Crane & Hoist Corp.—44-page illustrated catalog No. 127 covers line of electric hoists. Contains information on adaptability and application, as well as listing speeds, lifts, dimensions and other data useful to plant executive planning material handling system. Company manufactures more than 5,000 types and sizes of electric hoists.

25. Pumps

Aldrich Pump Co.—16-page illustrated catalog No. 100 shows representative pumps and hydraulic equipment for power plants, oil fields, process industries and marine use. Nearly all pumps are built to order, using standard parts such as frames where possible, but with fluid ends designed and finished to individual requirements.

26. Colloidal Graphite

Acheson Colloids Corp.—4-page illustrated bulletin No. 422 discusses use of "dag" colloidal graphite as parting compound. Booklet also shows how this lubricant works for safety of deep sea diver and aviator in protecting hose connections from corrosion. Uses are pointed out in foundries, glass and rubber industries.

27. Rust Preventive Compounds

Simonds Co.—4-page illustrated technical bulletin No. 7 describes Corol compounds for insuring defense and ordnance materials against rust and corrosion during shipping and storage. Charts list various groups of compounds in types and grades meeting government specifications. Compounds may be applied by dipping, spraying, brushing or swabbing.

28. Vacuum Pumps

American Automatic Typewriter Co.—4-page illustrated bulletin No. 10 describes "Schulz" bellows type vacuum pumps. Designed for production and laboratory applications, pumps are available in three standard sizes. Construction features and specifications for each model are included.

29. Cleaning Solution

Turco Products, Inc.—8-page instruction bulletin explains use of "Steamfas" water conditioned, extra heavy duty compound for steam vapor machines and hot tank cleaning. Exact procedures to be followed for various applications are presented in detail.

30. Graphite Linings

United States Graphite Co.—8-page illustrated bulletin No. 6249 is entitled, "Mexaloy Linings for Ladles, Spouts, Runners and Cupolas." Use of this specially prepared graphite product combined with refractory materials is explained. Being chemically inert, lining is protected from rapid solution into slag and metal.

31. Mill Type Shears

Thomas Machine Manufacturing Co.—8-page illustrated bulletin No. 126 contains concise descriptions on line of plate shears ranging in capacities up to 3-inch plate thickness and widths up to 14 feet or more. Various styles and designs are available for all types of mill shearing operations.

32. Carburizing Furnaces

Surface Combustion—4-page illustrated bulletin No. SC-109 describes batch type gas carburizing furnaces in various sizes and capacities for production use. Typical installations are shown and radiant tube heating principle is explained.

33. Power Cable

Welding Engineering Co.—1-page data sheet on "Tufcord" multi-conductor power cable presents specifications on two, three and four-conductor heavy duty flexible cable for use on portable tools, electric motors and welding machines. Also covered is special three-conductor heavy duty cable.

34. Hose & Tube Fittings

Weatherhead Co.—8-page illustrated catalog supplement shows complete line of valves, fittings, accessories and flexible hose assemblies for automotive, aviation, industrial, marine and refrigeration installations. All parts are shown and available sizes listed.

35. Turret Lathe Tools

Warner & Swasey Co.—30-page illustrated manual entitled, "Better Performance from Single Cutter Bar Turners," shows how this tool can be used most efficiently on bar work. It reviews basic principles of tool and explains how they are applied in actual production. Step-by-step procedures are covered in text and explanatory sketches further guide operator.

36. Weld Crater Eliminator

Wilson Welder & Metals Co.—Illustrated data sheet, form No. ADW-41 explains how to overcome arc craters, porosity and gas pockets through fading out of arc, accomplished with "Stroco" crater eliminator. Attachment may be used on "Wilson" direct current arc welding machines for both automatic and hand welding operations.

37. Vertical Screw Machine

C. I. Togstad Co.—16-page illustrated catalog No. V-100 gives full details regarding design, operation and features of "Eaglefield" 12-spindle "Verti-Matic" combination bar feed and chucking automatic screw machine. Hydraulically operated, machine is of vertical design which requires minimum of floor space. Each spindle is driven by independent electric motor.

38. Steel Tubing

Summerill Tubing Co.—12-page illustrated bulletin No. 443 contains practical data on wide range of tubing, including tapered and formed tubes, as well as wide variety of special shapes. Guide chart presents detailed information on chemical composition of 25 different metals in regular production, together with size range for each, mechanical properties and physical properties.

39. Evaporator-Crystallizer

Struthers Wells Corp.—12-page illustrated bulletin on "Evaporator and Crystallizer Equipment" explains methods and apparatuses developed for separating chemicals in crystalline state from solutions. Vacuum and cooling crystallizers are described and their operation shown. Special adaptations of equipment for various purposes are covered.

40. Electric Generators

Westinghouse Electric & Manufacturing Co.—16-page illustrated bulletin No. B-3028 describes line of alternating current generators ranging in size from 25 to 2180 kilovolt-amperes. These machines are designed for diesel engine drive and for use in municipal lighting plants and for industrial standby or emergency power. Also covered are switchgear, voltage regulators and exciters.

41. Record System

Visible Index Corp.—6-page illustrated folder, "VISIrecorder II," explains use of these newly developed dual diagonal indexing cards which make possible breakdown of information on two separate and distinct margins. System is particularly applicable for inventory, materials control, personnel records and similar data.

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from 1440 degrees Fahr., followed by rehardening. This stress relief was not satisfactory due to the mixture of coarse and fine grains. In view of these results a full anneal of all high-speed tools before rehardening is recommended.

These steels were also examined for Shepherd fracture characteristics and intercept grain count. These results are given in Table III.

Since it is recommended that tools be given a full intermediate anneal, it is necessary to protect the surfaces of these tools during this operation. This can be done either by packing in a neutral material such as sand containing a small percentage of charcoal, gray cast iron borings or by packing in one of the several proprietary compounds developed especially for this purpose. All protect the surface well, prevent the formation of hard scale and at the same time guard against decarburization.

When the steel is packed, it is important to allow the pack to "breathe." A gas tight pack is undesirable since it will not allow for the expansion and contraction of gases and may result in explosion. It has been found expedient to use packs which are welded on one end and closed on the opposite end with a metal disk and a suitable clay.

It is hoped that the information presented here will be of material help in getting the full quota of service from high-speed steels.

300% Tool Life Increase

(*Continued from Page* 88)

that every regrind decreased the difference in performance of the treated and untreated tools.

However, the amount of metal removed in resharpening had much to do with this effect. Where the tool could be resharpened by grinding off only 0.001-inch or less, the treated tool continued to give much better performance than untreated tools. But when considerable metal was removed in resharpening, the treated tool showed up to much less advantage. This indicates the importance of removing as little metal as possible in resharpening—much less than is usually removed.

Too, the type of cutting tool, the way the cutting edge operates on the work, and other operating conditions influence tool resharpening methods. Users of the process will do well to re-examine their entire tool sharpening practice. It is strongly suggested that users spend some effort to carefully determine optimum procedure. *It may pay to retreat the tools without resharpening them by grinding.* Due to their shape, many tools do not lend themselves easily to resharpening by grinding. Certain types

Acme-Gridley Automatics are fighting on every production front—turning out vast quantities of vital metal parts—with characteristic accuracy, speed and economy. Handling these indispensable production units in connection with machining, assembling and shipping operations are nine Euclid Cranes.

These cranes were selected largely because of long demonstrated reliability, convenient floor control and high headroom clearance that permits high piling of heavy parts. They operate almost continuously 24 hours a day, 6 days a week.

The basic aim in designing Euclid Cranes, and Hoists, too, has always been to embody features that assure long, trouble-free service with minimum attention and upkeep cost. That they measure up to this standard is indicated by the discriminating type of purchasers—many of whom have reordered Euclid equipment each time a new demand has developed.

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of broaches, milling cutters, reamers and similar items are in this class.

NO GRINDING: The development of a method of resharpening such tools without grinding the cutting edges may be significant. In many cases the following method has been found practicable: After a treated tool has outlasted an untreated tool two or three times, the tool has the chromium stripped and is replated. Care should be taken to see that the chromium is stripped before the base metal of the tool has been injured. The stripping can be done chemically in a cold solution of equal parts by volume of hydrochloric acid and water, or electrolytically with reverse current in a warm chromic acid solution at 18 degrees Baume.

When replated by the Lundbye process, the result is a new sharp tool produced without the aid of a grinding wheel. This has already been done with many items such as reamers, type gages, forming tools and the like.

EQUIPMENT: The original installation at the Crowell-Collier Springfield, O., plant was made from obsolete material. An old second-hand generator from a worn-out Buick was purchased from a junk dealer. This unit has a capacity of 33 amperes at 6 volts. It is driven by a used ¼-horsepower electric motor through a belt as can be seen in Fig. 1. The generator leads run to a simple control board on which are mounted a reversing switch for the electrolytic cleaning cycle, an ordinary off-on snap switch to start and stop the motor, a field rheostat, a voltmeter and ammeter.

Five incandescent lamp bulbs of various sizes are used as a resistor bank and are controlled by individual switches on the control board. The lamps can be seen immediately above the motor-generator set just below the bench in Fig. 1.

According to Axel E. Lundbye, chief engineer, Crowell-Collier Publishing Co., the whole outfit cost less than $50. He has plated thousands of small tools successfully with this equipment and it is still being used to help handle the many requests for sample processing.

The plating tank, Fig. 1, is made of wood, lead lined. It measures 8 inches deep, 8 inches wide and is 18 inches long. Ventilating ducts provide a current of air that moves across the top of the tank to take away fumes generated during plating.

The small circular tank seen on the bench immediately above the motor in Fig. 1 is a welded steel tank used for the electrolytic cleaning cycle when tools are in the plating tank being coated. This makes possible increased utilization of the equipment since it obviates the necessity of stopping the plating for the cleaning cycle, thus greatly increasing

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the amount of work that can be handled through the small plating tank.

The original oil treating tank as seen in Fig. 4 is welded from 16-gage steel and is also 8 inches deep, 8 inches wide and 18 inches long. It is mounted on four feet which hold it above the gas burner used to heat the oil. A thermometer seen extending out of the tank at the left is used to check oil temperature.

Due to the tremendous amount of interest in the process, it has been necessary to set up a modern research laboratory at the Springfield, O., plant. Services of its facilities and staff are available to those using the process.

Of course a larger installation has now been made to handle the great demands for sample processing that occurred as a result of the company's offer to treat sample tools for any war production plant without charge, as was mentioned in the first part of this article June 14.

It should be understood that the Crowell-Collier Publishing Co. does not represent or warrant that this process does not infringe on patents owned by others.

Installation, Fig. 3, consists of motor driving a 800/400-ampere 6/12-volt direct-current generator connected to two tanks, the largest of which can be seen at the left in this illustration. This tank is 18 inches deep, 18 inches wide and 120 inches long. These tanks are also of wood, lined with lead. Ventilation is provided by an exhaust fan and proper ductwork.

The sheet metal tank at the extreme right in Fig. 3 is the oil processing tank for the larger installation. It also is heated with gas burners, is provided with a cover and exhaust ducts for ventilation.

This equipment is now being operated on a 24-hour 7-day basis to handle the large volume of requests for sample processing that come in from war plants.

Electric Process Makes Iron Direct from Ore

Following ten years of experiments, a new method of using electricity to produce malleable iron direct from the ore without first making pig iron has been perfected by a Swedish scientist. The development is said to result in considerable savings, both in fuel and power.

Professor Martin Wiberg of the Royal College of Technology, in Stockholm, is credited with perfecting the process, according to an announcement made befor the Swedish Iron Masters Association by Einar Ameen, a director of the Soderfors Iron Works. It was in the Soderfors plant that Professor Wiberg conducted his experiments, which were shrouded in secrecy.

The "B" stands for Bissett, of course, for it was Bissett service which made possible the prompt delivery of the bored shafts shown above. These 9 shafts—14 feet long with 7½" O.D. and 4" I.D. —were supplied to a war plant completely machined, heat treated and ready for use.

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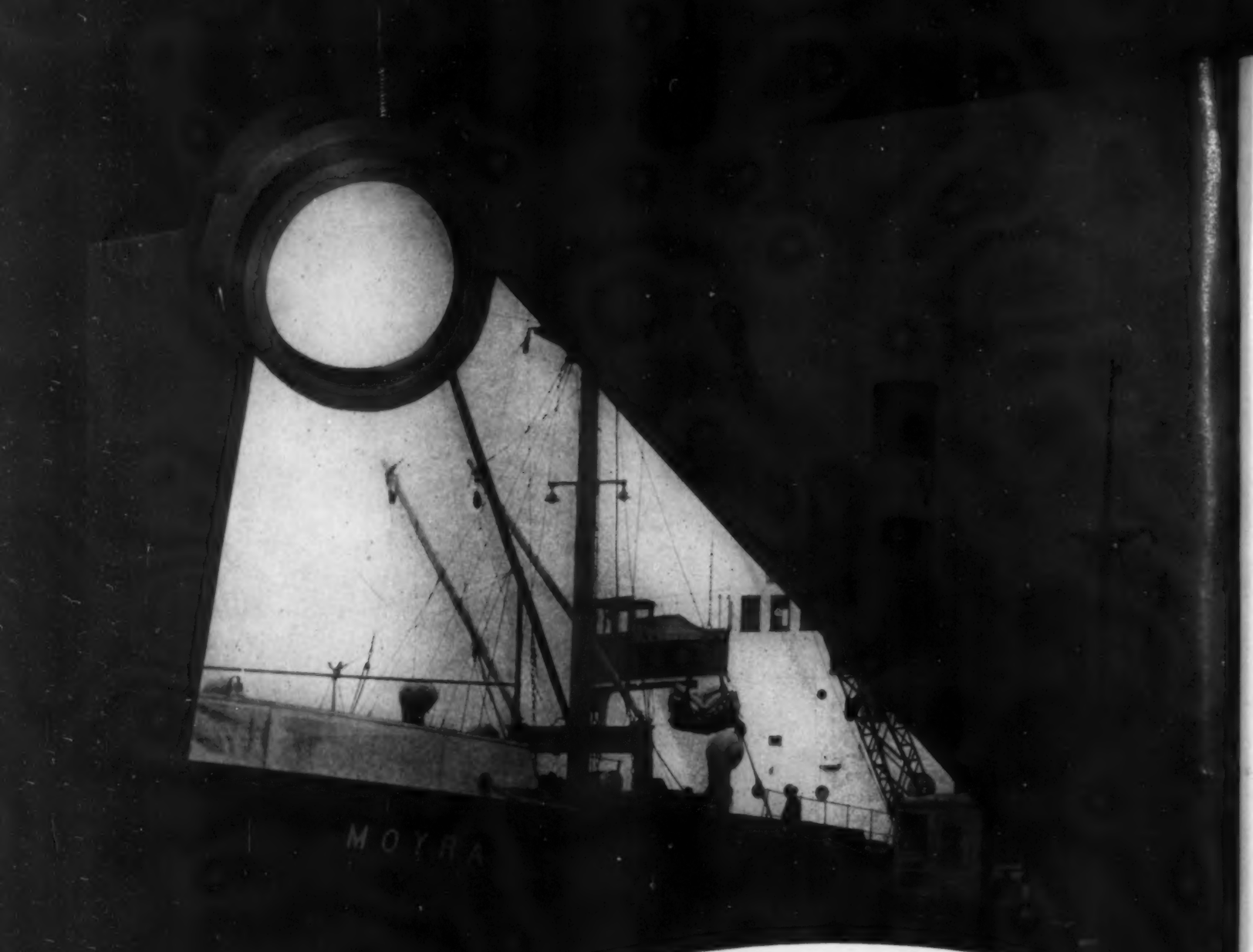

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DEMAND
Despite shifts, mill backlogs increase.

PRODUCTION
Steady at 98½ per cent.

PRICES
New warehouse zones effective.

CANCELLATIONS of steel orders due to cutbacks in the ordnance program appear to have run their course, few having been received for the past few days. In their stead is an expanding volume of tonnage affecting most major products.

Increase in plate demand is particularly noticeable over the past fortnight and most platemakers are booked solidly through third quarter, with October capacity rapidly disappearing. Maritime Commission is responsible for at least 50 per cent of tonnage now on order with expansion in demand from other sources. High-test gasoline refinery tonnage is increasing as a new program gets under way. A plant for the Publicker Commercial Alcohol Co. in Philadelphia, to cost $5,000,000 and a $1,250,000 refinery for Socony-Vacuum Oil Co. Inc., at Paulsboro, N. J., are among larger projects.

Mills are making a final drive to have all orders on books validated under CMP, which assumes full control July 1. While most orders have been validated a small percentage has not, either through carelessness of buyers or inability to obtain allotment numbers. A large producer estimated about 5 per cent of orders are in this condition.

• • •

Sheet mills, in spite of recent cancellations, are booked through third quarter except for some capacity for galvanized sheets and specialties. Narrow cold-rolled strip capacity is filling rapidly for fourth quarter and some producers have none to offer for that delivery. Aircraft inquiries for this material are appearing for delivery in June, 1944.

Despite the threat to steelmaking as a result of further stoppage of coal mining last week the ingot rate was unchanged at 98½ per cent. Although five blast furnaces were banked in the Pittsburgh district part of the week steel production increased ½-point to 98 per cent. Chicago advanced 1 point to 98 per cent, Cincinnati 2 points to 95, Cleveland ½-point to 95, and Detroit 5 points to 92 per cent. Wheeling declined 3½ points to 86½ per cent and eastern Pennsylvania 1 point to 93 per cent, the latter being a result of a strike. Rates were unchanged at Buffalo, 90½; St. Louis, 95; Youngstown, 97; Birmingham, 100; New England, 95.

Some decline is noted in demand for merchant pig iron by jobbing foundries in several districts. This results in part from lighter castings buying and also from lack of manpower in foundries. In some cases foundry operation has been cut half or more from former production rates, many workers having left for easier and better paid work. A number of shops are closing during part of July for inventory and vacation. The lighter tonnage of pig iron for castings will not be reflected in production as steelmaking furnaces will absorb any excess which might develop. The new Bethlehem Steel Co. blast furnace at Lackawanna, N. Y., will be devoted entirely to iron for the steelworks and its production will not affect the merchant iron market.

Reduced volume of scrap is being received by melters in some areas, a result of labor shortage and inability to draw out as large volume of dormant material as was available last year. Some drives have resulted in only a fraction of tonnage expected. Many complaints are made of poor quality and grading, rejections resulting. In one district steelmakers are receiving a third less than they are consuming and reserves are being drawn down as a result. Some material is moving by boat from the head of the lakes, where considerable accumulations were built up during the winter. High lake levels allow larger cargoes to be loaded. Movement to Buffalo by the barge canal has started.

Six additional zones have been set up by OPA for control of steel warehouse prices, effective June 21. Methods of pricing are similar to those provided in the four Atlantic coast zones first established, varied in some details to fit customary procedure in the various areas.

• • •

Consumption of Lake Superior iron ore in May totaled 7,373,972 gross tons, third largest tonnage smelted this year, the peak being attained in January with 7,765,174 tons. Ore at furnaces and on Lake Erie docks June 1 aggregated 21,297,098 tons, a gain of almost 3,000,000 tons over stocks held a month earlier, but considerably less than tonnage on hand June 1, 1942, when 25,165,003 tons were at furnaces and on docks. Furnaces in blast June I numbered 173 against 169 a month earlier, in the United States.

Composite average prices of steel and iron products are steady at levels prevailing since control was established under OPA ceilings. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	June 26	June 19	June 12	One Month Ago Apr., 1943	Three Months Ago Feb., 1943	One Year Ago May, 1942	Five Years Ago May, 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	23.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	11.60

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	June 26, 1943	April, 1943	Feb., 1943	May, 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.49	2.49	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.15	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	June 26, 1943	April, 1943	Feb., 1943	May, 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.39	25.39	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.54	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.65	140.65	140.65

Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.50	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncropped, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36; Duluth (bil.) $36.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, $42.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton and Follansbee Steel Corp. $49.50 at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section: 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over, $56. Add $1.75 del. Detroit; $2.75 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, Galveston, No. 5—9/32 in., inclusive, per 100 lbs., $2. Do., over 9/32—47/64-in., incl., $2.15.
Worcester add $0.10; Pacific Ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c and Eckels Mfg. Co. 2.40c at established basing points. Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.80c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Eastern Mich. 2.25c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage. base 2.75c; Granite City, base 2.85c; Detroit del. 2.85c; Eastern Mich. 2.90c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Detroit del. 3.45c; Eastern Mich. 3.50c; Pacific ports 4.00c.
Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	....
65	7.15c	7.90c	....
58	7.65c	8.40c	....
52	8.45c	9.20c	....
U.S.S., R.C. Grade 10.10	....	....	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c;. Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg.
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.45c; Eastern Mich. 3.50c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.
Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.
Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.
Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth):
Bright basic, bessemer wire 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Wire Products to the Trade:
Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.55; Pacific ports 3.05c
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c
Woven fence, 15½ gage and heavier, per base column ..... .67
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70; single loop bale ties, column 59; fence posts, carloads, column 69.

Pipe, Tubes

Welded Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	⅜	34	16
¾	66½	55	½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c. Tie plates, $43 gross ton, base.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. ** Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.
Carriage and Machine
½ x 6 and smaller ..... 65½ off
Do., ⅝ and ¾ x 6-in. and shorter.. 63½ off
Do., ⅞ to 1 x 6-in. and shorter..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off
Stove Bolts
In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.
Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws
Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off
Square Head Set Screws
Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham
Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. .....$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton
Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943.
†$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha
Pure and 90% benzol 15.00c
Toluol, two degree 28.00c
Solvent naphtha 27.00c
Industrial xylol 27.00c
Per lb. f.o.b. works
Phenol (car lots, returnable drums).... 12.50c
Do., less than car lots 13.25c
Do. tank cars 11.50c
Eastern Plants, per lb.
Naphthalene flakes, balls, bbls., to jobbers 8.00c
Per ton, bulk, f.o.b. port
Sulphate of ammonia $29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.60	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.34

(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00-28.00
Do., barge	25.00-28.00
No. 2 lump	25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.33; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers plants, freight ton lots 15.00c, less-ton lots 15.25c, allowed; 1% iron; carlots 14.50c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; less 200-lb. lots 6.80c. Spot prices ton lots 6.30c; less-ton lots 6.55c; ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents up.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ¼-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.00c; ton lots 10.50c, less ton lots, 11.00c.

Borosil: 3 to 4% boron, 40 to 45% Si., $7 lb. cont Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	7.762[22]	6.062[22]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[22]	4.613[14]	4.103[22]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[22]	4.613[14]	4.103[11]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[18]	4.872[25]	4.072[21]	4.772	7.566[22]	5.866[22]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.75[21]	4.66	7.35[22]	5.65[22]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.81[1]	4.65[15]	4.30[10]	3.65[21]	4.35	7.35[22]	5.65[22]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	....	7.45[22]	5.75[22]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45	7.556[22]	5.856[22]
Cleveland (country)	3.25[1]	.	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.251[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[21]	4.659	7.680[22]	5.980[22]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[16]	4.77[24]	4.42[21]	.....	.....	.....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[16]	4.77[24]	4.42[21]	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	.....	.....	4.825[10]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.40[13]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[21]	4.65	5.75[22]	5.85[22]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.85[15]	4.10[24]	3.65[21]	4.55	5.75[22]	5.85[22]
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[10]	4.23[24]	3.88[21]	3.54	7.33[22]	5.88[22]
St. Paul	3.75[3]	3.80[3]	3.80[3]	5.40[3]	3.50[3]	3.85[3]	3.85[3]	5.00[3]	4.35[3]	4.34[21]	3.83	7.70[22]	6.00[22]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[10]	4.24[24]	4.02[21]	3.61	7.72[22]	6.02[22]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[10]	4.25[24]	3.97[21]	.....	.....	.....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[10]	4.00[24]	3.97[21]	.....	.....	.....
Memphis, Tenn.	3.90[3]	3.95[3]	3.95[1]	5.71[3]	3.85[3]	4.10[3]	4.10[3]	5.25[11]	4.66[24]	4.31[21]	.....	.....	.....
Birmingham (city)	3.50[3]	3.55[3]	3.55[3]	5.83[3]	3.45[3]	3.70[3]	3.70[3]	4.75[10]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham (country)	3.40[3]	3.45[3]	3.45[3]	5.83[3]	3.35[3]	3.60[3]	3.60[3]	4.75[10]	4.78[24]	4.43[21]	.....	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[20]	4.95[10]	4.60[21]	5.00	.....	.....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[20]	4.95[10]	4.60[21]	.....	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.75[3]	4.30[3]	4.30[3]	5.25[24]	5.43[10]	4.50[23]	.....	.....	.....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[10]	7.15[3]	5.70[23]	.....	9.55[22]	8.55[22]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[10]	7.55[10]	5.55[10]	.....	9.80[3]	8.80[3]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[10]	7.45[10]	5.45[10]	.....	.....	.....
Tacoma	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.25[3]	5.45[3]	5.70[3]	6.63[24]	5.75[23]	.....	.....	.....
Seattle (city)	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.35[3]	5.45[3]	5.70[3]	6.63[24]	5.75[23]	.....	.....	8.00[3]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in amendments Nos. 10 to 16 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base.

Ores

Lake Superior Iron Ore
Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. (S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80
less $7 freight allowance	

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	.....	.....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8615	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	.....	.....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	2 ft. and less	1 ft. and less	Foundry Steel 2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville.	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85										
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 14.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 13.50c; No. 12 foundry alloy (No. 2 grade) 13.50c; chemical warfare service ingot (92½% plus) 13.50c; steel deoxidizers in notchbars, granulated or shot, Grade 1 (95-97½%) 13.50c, Grade 2 (92-95%) 13.50c, Grade 3 (90-92%) 13.00c, Grade 4 (85-90%) 12.50c; any other ingot containing over 1% iron, except PM 754 and hardeners, 13.50c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62¼c; Grade D, 99.0-99.74% incl. 51.12½c; Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

New Zone Warehouse Prices Now Effective Over Six New Areas

DOLLARS and cents prices for prime quality iron and steel products sold by heavy-line steel warehouses went into effect June 21 in six additional zones, making ten zones in all. The entire country except the South and Pacific Coast states now is zoned. OPA plans zoning of the latter areas later in the year.

This zoning price program is an effort by OPA to reflect the normal marketing areas and practices that have grown up over the years, while preserving prices essentially at the base period ceiling level. Specific prices and method of determining them have resulted from thorough collaboration between special committees appointed by the steel warehouse industry in each marketing area and OPA.

While in some instances prices are slightly higher or lower than those existing under the original price order No. 49, their general level within each zone is that of the base period, April 16, 1941.

Although the aggregate of the base price, and extras or deductions for identical products are generally uniform throughout one zone, the one variable pricing factor—freight—prevents the occurrence of any single uniform delivered price for all points in the zone.

Under the new zone price set-up it is believed that both warehouse sellers and their customers will be able more precisely and easily to determine maximum delivered prices under the schedule.

Many warehouse distributors, particularly smaller sellers, frequently had difficulty in determining the correct maximum delivered price under the former order, due to the inability of obtaining full information on listed city sellers' prices. This led to inadvertent violations of price ceilings in some instances. The dislocated tonnage clause on shipments of 150 miles in the general direction or beyond a listed city, or 350 miles in any direction, also caused confusion. In lieu of this under the zone price structure these deductions are reflected on inter-zone shipments rather than upon distance or direction from shipping point. There are also special freight provisions with relation to use of charges on truck shipments not formerly incorporated in the regulation.

On inter-zone shipments warehouse distributors have the option of meeting the zone destination price or of absorbing $3 to $5 freight equalization, depending on whether the shipment is made by rail or other than rail delivery.

Maximum delivered prices on iron and steel products not covered by the new zone price structure will continue to be determined in accord with the formulas covered by the applying sections in the revised schedule. Products of this character include merchant wire products, wire rods, water, oil country and other pipe and tubing, tool steel, rails and track accessories, armor plate, etc.

On the new basis any authorized warehouse may sell at the maximum delivered prices established in the amendment, irrespective of his own April 16, 1941 prices. If the seller's prices for that period are in excess of those established under the amendment he must bring them into line with prices under the regulation.

As far as the products covered by the zone price set-up are concerned listed cities are eliminated. Free delivery areas as formerly understood are also eliminated. In the new established basing point cities delivery at maximum delivered prices specified in the regulation is required within the railroad switching limits of such basing points.

To facilitate handling of orders under the new regulation warehouse steel sellers will soon publish a price list containing delivered price on all items handled for all points within their zone. These prices will represent the mill base price, plus freight and warehouse spread to the destination point. They will not include the extra charges.

Steel Castings Price Provisions Revised by OPA

Maximum charges producers may make for machining steel castings in connection with their sale are established on basis of his March 31, 1942, machining rates or on his base period costs and profit margin. Maximum charges that may be made when the machining is let out by the producer to an independent machine shop are based on costs plus the mark-up on March 31, 1942.

If the producer customarily did no machining or did not let out machining on the base date, he must submit a proposed price to Office of Price Administration for approval.

These charges are established in amendment No. 6 to price schedule No. 41, effective June 28. The amendment also makes the following changes:

1—Re-establishes prices for "miscellaneous castings" classifications appearing in the comprehensive Report of the Steel Founders' Society of America for the Third Quarter of 1941 as maximum prices.

2—Specific weight differentials for light castings are established under several "X" classifications of prices.

3—Maximum prices for chocks, bollards, bitts and cleats are established as the individual producer's July 15, 1941, price or the Comprehensive Report price, whichever is higher.

Sheets, Strip . . .

Sheet & Strip Prices, Page 132

Cancellations as a result of cut-backs have now about run their course and some leading sellers have not received cancellations due to this cause for more than a fortnight, although they have received small cancellations due to ability of consumers to obtain better deliveries elsewhere.

At present, however, virtually all large producers are booked solidly through the third quarter on hot and cold-rolled sheets, with some out of the market for October, as well. In fact, the next few days will see October capacity completely absorbed in some cases. A little galvanized capacity still is available in third quarter and also some for certain lines of special sheets.

The recent CMP regulation permitting consumers to place orders tentatively for rolling within the following two months of the period originally requested, is proving generally helpful to buyers and producers alike. However, some believe that the seven-day period in which revalidation must be made so as to make the tentative orders stick is not quite long enough, that a few additional days would be helpful.

Narrow cold strip mill capacity for fourth quarter is filling rapidly and in scattered cases producers are booked up to quotas for that period. For aircraft, orders are appearing for delivery into June, next year. While aircraft requirements are mounting, links and clips account for large tonnages of strip. Fabricators frequently find regular suppliers booked for periods of wanted deliveries and are forced to seek open capacity for orders. In theory, with shipments of hot strip well maintained to directives, better balanced scheduling should be attained under forward buying, but revisions often work against this.

Bars . . .

Bar Prices, Page 132

While cutbacks and revision of war contracts affect bar demand in New England, overall requirements are maintained and in the case of alloys for forging shops specifications are heavier. This applies notably to those producing for the aircraft industry and one company with shops in Massachusetts and Illinois, up to now taking 10,000 tons a month is working toward 15,000 tons.

Affecting approximately 35 subcontractors, a prime contract for sub-machine guns with the Marlin Firearms Co., New Haven, Conn., has been halted and the latter shop is filling capacity for power drilling, profiling, spline milling, turret lathe work and other precision machining. The shop is still making gun barrels for carbines. Demand for bars for small arms remains heavy. An ordnance plant in the Hanover, Mass., district has been placed on a standby basis; this unit was engaged in shell loading.

More producers are filled for third quarter on all hot-rolled mills and the best promised on cold-rolled, small sizes, ⅝-inch is October; larger rounds, November, while hexagons and squares, ⅝ to 1⅛-inch, are available for December. Demand for the latter shapes and sizes is heavy for stop nuts. Melts involving a large tonnage of bars bought for the Navy have been revised to meet special quality requirements; some tonnage has been shipped on the first specification. Available supplies of semifinished steel for bar mills is a matter of concern, especially for quality grades requiring additional hot-topping, extra cropping and shipping; preparation of billets under rigid inspection tends to limit the volume of semifinished going to bar mills.

Follansbee Steel Corp., Pittsburgh, will install a merchant bar mill and will produce rounds, hexagons and flats in all standard sizes, in open-hearth alloys. To this time Follansbee has rolled only 4 x 4-inch billets in addition to its flat-rolled products.

Plates . . .

Plate Prices, Page 133

Increase in plate demand is noticeable over the past fortnight. Many producers are booked solidly through third quarter, with available October capacity dwindling rapidly. One unit of an important producer is booked fully to November. Maritime Commission work accounts for at least 50 per cent of tonnage now on order. Expansion is noted in several other directions. High-test gasoline refinery tonnage has shown increase, with a new program getting under way. Considerable locomotive plate business is developing in some districts, reflecting military needs and substantial lend-lease requirements. Included in projects requiring plates are a $5,000,000 plant in Philadelphia for the Publicker Commercial Alcohol Co., and a $1,250,000 refinery for Socony-Vacuum Oil Co. Inc., Paulsboro, N. J.

Broadening demand for plates is accompanied by contracts for approximately 4000 small steel ships which will require several thousand tons of floor plates. Warehouses are rarely getting full quota of plates, allotments in some instances having been reduced as much as 50 per cent. Often jobbers are not notified of the reduction in time to allow them to replace the missing tonnage by other products to which they are entitled. Also secondary sellers are getting a substantial part of their tonnage in mill end odd sizes, requiring more shearing and scrap loss; after deducting tonnage used in flame-cutting, warehouses have limited supplies of standard and even off-sized material to meet a brisk demand. Some are reluctant to continue taking more mill end sizes, applying against quotas at full prices.

Wire . . .

Wire Prices, Page 133

Demand for wire entering into major war programs continues heavy and unabated. Capacity for products requiring processing is filled for the third quarter and beyond for numerous items. Large wire tonnages are required for welding electrodes, rope, signal wire and bullet-core steel. Contracts for the latter have been further spread to meet demand. Producers of steel wool are specifying heavily on low carbon round wire for camouflage material. Steel wool manufacturers have doubled capacity in numerous instances.

Spring wire for mechanical uses, requiring long processing, has been ordered for delivery as far ahead as first quarter, next year. Few steel products have felt the effect of this mechanical war more than springs, demand for which is mounting, including valve spring wire. Aircraft is absorbing much alloy material. Although producers have stepped up production of bare welding wire to a point where output is better balanced with requirements, current tonnage is going into consumption without inventories growing.

A large part of rimmed steel ingots available to wire mills is taken for welding rods. Included in heavier tonnages of semifinished slated for lend-lease third quarter are wire rods which portends a further tightening of steel for finishing mills. Already rods in sizes for the manufacture of nuts are tight. Some screw manufacturers are buying relatively more finished wire than rods, drawing less in their own shops.

Pig Iron . . .

Pig Iron Prices, Page 134

Jobbing iron foundries in the New York metropolitan area are experiencing a continued decline in demand for castings. As a result, it appears that there will be more suspension this summer for inventory and vacations than a year ago. Some foundries are down now for a week or more and it appears that a large number will be down for a week or ten days around the Fourth of July. Possibly the greatest number will be suspended for the period July 2-10.

As New York barge rates on pig iron have not as yet been established, iron from the Buffalo district continues to move east by rail. At present, apparently, there are no definite indications as to when barge rates will be set up. Consumers of Buffalo iron are nevertheless hopeful that such action will be taken before the summer season becomes much further advanced.

But even though barge rates should be established, it might take some adjusting on the part of both producers and consumers of Buffalo iron before the inland water movement could be gotten under way. At Buffalo, the producers, it is claimed, have not enough iron in storage to permit them to load

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barges without some delay, while seaboard consumers in various cases have not enough inventory to permit them to wait for tonnage to be loaded and moved over the canal and in the case of New York district consumers in particular, down the Hudson river.

Output of the new government-owned "C" blast furnace at the Lackawanna, N. Y., plant of Bethlehem Steel Co., is expected to be used almost entirely for ingot production during the war. Additional competition for merchant iron business is expected after the close of the war.

Gray iron foundry operations in New England are spotty. Some shops are maintaining schedules at 48 hours a week, while others are more curtailed. This is reflected in pig iron allocations which for July are slightly lower. The loss applies entirely to foundry grades with malleable and basic melt maintained. Within the total tonnage allocated there are more requested revisions in sources of supply. This is partly due to recent repairs to two furnaces shipping iron to New England and also to more concern as to prices and costs. With lower melt, higher coke, the last 50 cent advance having been absorbed by the foundries, and other factors making for higher costs, melters are reluctant to add pig iron to the list, now that pressure for supplies is off; castings are sold at unchanged ceilings and this situation is more evident in requisitions for iron. The largest basic consumer in New England will again get July iron from a steelworks furnace in the Buffalo district.

Scrap . . .

Scrap Prices, Page 136

Scrap gathering is slow as a result of labor shortage, recent floods and preoccupation of farmers with their planting and harvest. Scarcity of trucks is another factor in some areas.

Disappointment has resulted from some drives put on to gather dormant material. In one Missouri county only 20 per cent of expectations was realized and in Nebraska only 10 per cent of quota was obtained.

St. Louis district melters are receiving 35 per cent less than is being consumed in open hearths and reserves have been drawn on to that extent, diminishing provision for the future by that proportion. Melters there are apprehensive of conditions late in the year.

Buffalo melters find much inferior material is being offered and rejections are frequent, one mill refusing 12 cars in a single day, some being allocated scrap from other districts. Higher lake levels make possible an additional 500 tons per cargo from the head of the lakes. Two cargoes have arrived so far this year and several barges have been received from the East by way of the canal.

About 800 tons of North African scrap arriving at an Atlantic port a few days ago consisted mainly of prime and secondary grades and included little equipment actually damaged in battle. It will have to be cut up and graded. Bids were submitted on the material on barges after being discharged from the ship. Unsuccessful bidders included one consumer. More thought is being given this scrap on the other side for use later in Europe for rehabilitation.

Steel scrap originating at shipyards in New England is heavier and is readily moved, some by allocation to electric furnaces, while substantial tonnage is directed back to open-hearth steel works. Dealers are also moving a share of the material. This steady disposal of shipyard scrap contrasts with the lag in lighter plant material, boring and turnings. There are more rejections on analysis of the latter. Production of alloy turnings has slowed slightly, but still exceeds demand, although definite tonnages are allocated to certain mills. There is less evidence of price shading than was the case several months back. This failed to move additional tonnage. The volume of scrap moving to dealers' yards continues to shrink, a trend which should influence future supply.

Volume of open-hearth scrap reaching dealers' yards in the New York area is light but more tonnage is reaching melters than would be indicated by this situation, due to allocations to eastern Pennsylvania of material bypassing the dealer. Most shipyard scrap and railroad scrap are returned direct to mills. Allocations requiring longer freight hauls have practically ended, melting steel going generally to mills normally supplied from this district.

Iron Ore . . .

Iron Ore Prices, Page 135

Consumption of Lake Superior iron ore in May totaled 7,373,972 gross tons in the United States and Canada, ac-

AMERICAN FULL ROLLER BEARINGS are *engineered* to give super bearing performance in the most ponderous, powerful equipment, required for extra heavy-duty service. Specifically built to withstand terrific strains and stresses, AMERICAN FULL ROLLER BEARINGS function smoothly, flawlessly under the most gruelling service conditions. Rugged durability and long life—often outlasting the equipment itself—plus continuous, trouble-free performance, have established their leadership under all conditions requiring bearings capable of withstanding brutal punishment and abuse. Once adopted, no equipment manufacturer has ever had to switch from AMERICANS.

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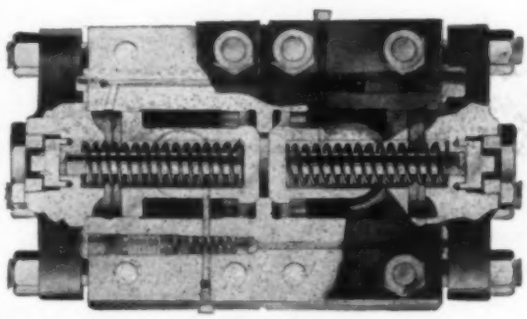

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Triple Reduction Continuous-Tooth Herringbone Gear Speed Reducer (with cover removed)

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These units are the product of an organization with over a half-century of gear making experience and have a wide use in many different industries.

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cording to the Lake Superior Iron Ore Association, Cleveland. This was third largest consumption this year, being exceeded only in March and January, the latter setting a new all-time record at 7,765,174 tons. In April 7,186,201 tons were smelted and in May, 1942, the total was 7,229,900 tons.

Furnaces in blast June 1 numbered 173 in the United States and nine in Canada, compared with 169 and nine a month earlier and 170 and eight a year ago. Nine stacks were idle in the United States June 1 and none in Canada. As of May 1, 13 were idle in the United States and none in Canada.

Total ore at furnaces and on Lake Erie docks June 1 was 21,297,098 gross tons, compared with 18,496,988 tons May 1 and 25,165,003 tons as of June 1, 1942. Of the furnace stocks 18,519,929 tons were at United States stacks and 650,747 tons in Canada. A month ago the figures were 15,681,998 and 503,271 tons.

Nonferrous Metals . . .

Nonferrous Prices, Page 137

New York — Allocation of copper is closely knit to scrap supplies which have appeared in heavier tonnage in some directions. Where scrap is available in volume, more is included in melts and less primary copper is required. While this effects distribution among individual consumers, the overall tonnage of new metal allocated is not materially lower. Nevertheless, allocations during the last two months are somewhat below the peak earlier this year and pressure for tonnage is less. Among brass mills there are indications the ammunition program will be slackened in July.

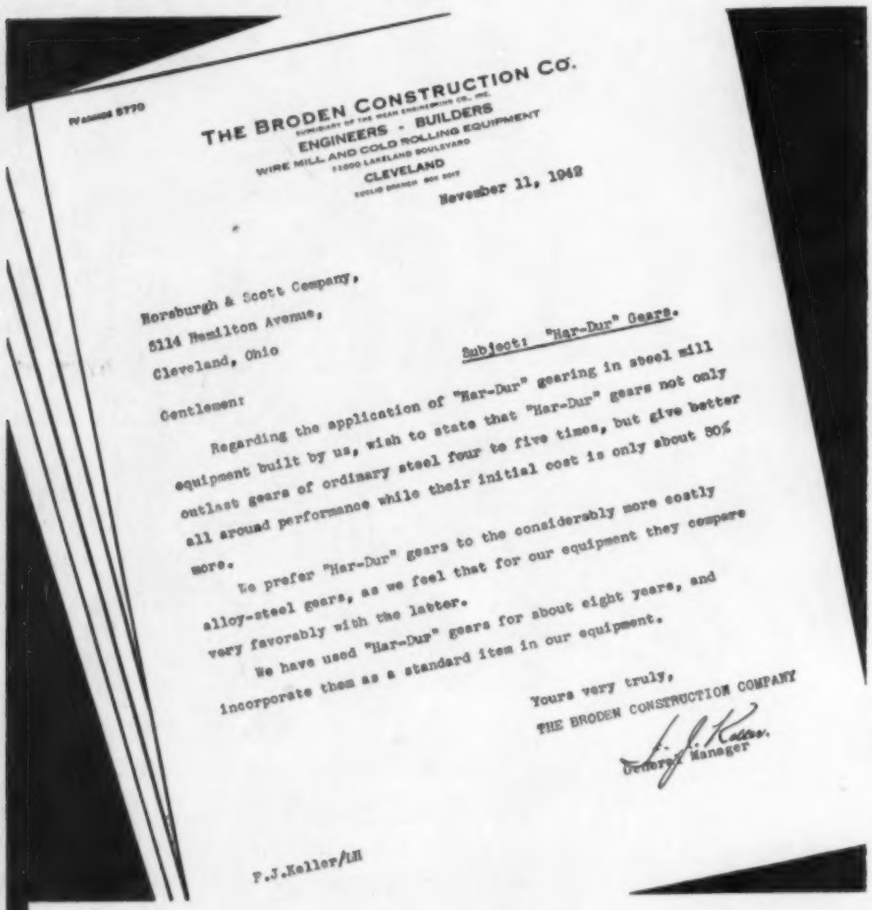
There have been few letdowns in rigid control of copper distribution and use and WPB wants heavier output, a goal confronted by need of more miners. Practically all domestic supply for July has been allocated and some fill-in shipments of foreign copper by MRC are expected. Consumer tonnage from this source has been lower of late and some additions have been made to the stockpile.

In the price field, ceilings have been placed on brass mill products sold by distributors. Details are given on pages 57 and 144.

Additional capacity for the production of aluminum is coming into production rapidly as the expanded aircraft program develops. Second largest aluminum alloy sheet mill in the world has started production in Chicago. Operated by the Aluminum Co. of America, this mill also will produce alloy ingots for delivery to other plants for forgings and extrusions. More aluminum plans are under consideration by WPB to meet the expected increase in bomber construction in 1944. A preliminary survey covers a proposed plant in New York city, a reduction unit of four to five "pot lines" with an annual output of 175,000,000 pounds. A new plant is already in production in Queens, New York city, also rolling mills in Massena, N. Y. The post-war capacity for aluminum production portends keen competition from that metal with the return of peacetime activities.

With July allocations for zinc being released this week, high grade is easier with prime western somewhat tighter, reversing a trend of recent months. Consumers are getting all the zinc requested with galvanizing requirements up slightly. WPB rates zinc as a critical material, supply of which the board says is inadequate for war needs. Chief uses are for the services, brass cartridge cases being an alloy 30 per cent zinc. The military requirements have reduced use of zinc for electric batteries due to limitations placed on the various types of batteries that can be produced.

A large lead stockpile which, it appeared, would remain constant is being dug into at an accelerated rate. This stockpile had been increasing in volume for some time, but since the early part of April it has begun to dwindle. In addition, domestic production has already declined substantially, one mine reporting a 12 per cent drop in the last 60 days. While this nation has ample supplies of lead on hand and in production to meet estimated military requirements as well as essential civilian needs, conditions are variable and an accelerated decline in production might change the picture drastically since the United States is far from self-sufficient. Large quantities of lead must be imported, principally from Mexico, and current receipts might be increased if shipping permits. Though lead supplies are getting tighter, that



THE BRODEN CONSTRUCTION CO.
ENGINEERS - BUILDERS
WIRE MILL AND COLD ROLLING EQUIPMENT
CLEVELAND

November 11, 1942

Horsburgh & Scott Company,
5114 Hamilton Avenue,
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Subject: "Har-Dur" Gears.

Gentlemen:

Regarding the application of "Har-Dur" gearing in steel mill equipment built by us, wish to state that "Har-Dur" gears not only outlast gears of ordinary steel four to five times, but give better all around performance while their initial cost is only about 50% more.

We prefer "Har-Dur" gears to the considerably more costly alloy-steel gears, as we feel that for our equipment they compare very favorably with the latter.

We have used "Har-Dur" gears for about eight years, and incorporate them as a standard item in our equipment.

Yours very truly,
THE BRODEN CONSTRUCTION COMPANY
L. J. Keller
General Manager

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★ This shows just one of many letters that tell what an excellent job "HARD-DUR" Gears are doing. "HARD-DUR" Gears not only have involute teeth that are produced to very high standards of accuracy, but the tooth form is preserved because the material is scientifically heat-treated and is highly wear-resistant.

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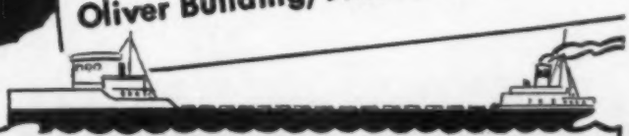

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Carbon Determinator provides accurate and rapid carbon determination of ferrous and non-ferrous materials, well within A.S.T.M. specifications for control work . . . and within two minutes.

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Complete line of spectrographic equipment and accessories. Designed to meet the exacting needs of modern research or control analysis.

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does not mean that it should not be substituted for more critical metals, since various adjustments could be made in order that lead be made available for the most essential purposes of war production, the WPB said. WPB officials agree a false impression had arisen concerning the plentifulness of lead, and again emphasized the necessity for stepped up domestic production.

OPA Sets Ceiling on Brass Mill Product Prices

Office of Price Administration has issued a new regulation, No. 408 (Distributors' Prices for Brass Mill Products and Services), establishing maximum prices for brass mill products and services at October, 1941, levels and permitting the continuation of distributors' mark-ups over mill prices existing at this time up to 3 cents a pound on all items except pipe or water tube, effective July 19.

Distributors' new ceiling prices are as follows:

1.—Maximum prices for shipments direct from producing mill to customer, are established as current mill list prices to consumers. (Maximum mill list prices, are established by the general maximum price regulation as the highest prices charged by sellers during March 1942. Mill list prices, however, have not been increased since Dec. 26, 1940, so that those in effect in March 1942 are substantially those of Dec. 26, 1940).

2.—Maximum prices for warehouse shipments of pipe or water tube are established as current mill list price less discounts from list price applicable to consumers as stated in current mill price catalogs.

3.—Maximum prices on all warehouse shipments of brass mill products other than pipe and water tube are to be figured by use of the appropriate one of several alternative methods, but in no case shall maximum prices be higher than 3 cents a pound above current mill list price for the same quantity of the products.

4.—Maximum prices for services performed by distributors are established as:

(a) Highest prices the distributor had during October, 1941, for the same service.

(b) If the distributor did not have a price for the same service during October 1941, then the maximum price shall be figured by applying the pricing method used by the distributor for figuring the price of the most nearly comparable service during the period.

The regulation requires distributors to use the same terms of sale in effect during October 1941, under the same or most nearly comparable circumstances. Terms of sale include cash discounts, credit terms, allowances or non-allowances due to taxes, methods of billing, and payment practices.

Pacific Coast . . .

Seattle—Market conditions in this area show little change. In some instances plant additions are being federally financed where increased production is required. Shipbuilding is in high gear and the effects of this activity are reflected in subcontracts on which many small shops are working. Merchant bars are being used in large volume by the shipyards and rolling mills have full schedules. Reinforcing steel is at present of minor importance. Fabricating shops report no large tonnages up for

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OAKMONT, PA.

Answers to Quiz on Page 4

1. **False.** Modern blast furnaces are bigger and better than they used to be but there are fewer of them. Last year, 242 blast furnaces had a record-breaking capacity of nearly 64,000,000 tons. In 1913, there were almost twice as many furnaces, but their capacity was only 48,500,000 tons.

2. (b) $100,000,000.

3. (c) Electric furnaces produce high grade alloy steels for bombers, battleships and tanks.

4. (a) To meet vital war needs electric furnace capacity has been expanded by more than 140 per cent in the past three years.

5. (b) Bran middlings are used as a drying agent in the manufacture of tin plate.

6. (c) Over 630,000 men and women, executives and mill hands are working for victory in America's steel industry. They comprise the numerical equivalent of more than five field armies consisting of about 40 divisions, all told.

7. (c) In 1942, American steel furnaces worked round the clock 99.7 per cent of the time.

8. (b) Of the three states named only Wyoming has no iron or steel plant within its borders.

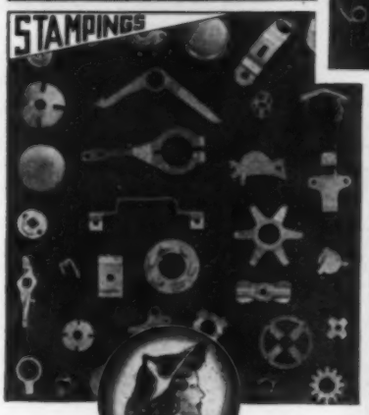
9. (c) In 1942 shipbuilders consumed nearly four times as much finished steel as they did in 1941.

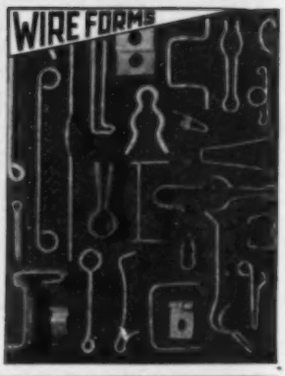
10. (c) About three tons of steel are used in making one of our heavy bombers.

MADE TO SOLVE YOUR PROBLEMS

Call on Hubbard's long experience and skill in developing and manufacturing parts like these, to accomplish the results you are after in those various design and production problems.

Send in your drawings, or describe your problem. Your inquiry will bring real assistance and the advantages of long experience.





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707 CENTRAL AVE., PONTIAC, MICH.

CAN'T GET 'EM UP *in the morning!*

It's those luxuriously comfortable beds at all

DeWITT OPERATED HOTELS

In Cleveland — **HOTEL HOLLENDEN**

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In Lancaster, O. — **THE LANCASTER**

In Corning, N.Y. — **THE BARON STEUBEN**

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DON'T OVERLOAD!

WRIGHT HOISTS are built to carry more than their rated capacities, but like other well-made pieces of mechanical equipment they should not be overloaded. Overloading is dangerous—while today, abuse to machinery is akin to sabotage.

Watch the bottom hook

WRIGHT load hooks are drop-forged from special steel which, when subjected to excessive overloading, give visible warning by opening slowly. When the bottom hook has started to open, look to the top hook, too, for while it is stronger than the bottom hook, it also may be reaching a danger point.

Watch the load chain

WRIGHT HOIST load chains are electrically welded from special analysis steel, exceptionally high in tensile strength and elastic limit. Excessive overloading will stretch the chains out of pitch, thus preventing proper fit with load wheel pockets. This results in destructive wear to both chain and load wheel. Keep your chains well lubricated for long life. Take proper care of your **WRIGHT HOISTS.** You'll find the name of your nearest **WRIGHT** distributor in the telephone book.

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WRIGHT MANUFACTURING DIVISION

York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

figures, practically all jobs being for war agencies.

Scrap continues in ample supply and no complaint is heard. Shipyards furnish most scrap now being used, although other material of less value is being processed and gradually worked into consumption.

Wholesale jobbing trade, while short of many items, finds sources of supply more dependable, although the movement of materials to the job is so continuous that it is almost impossible to accumulate stocks. Demand for cast iron pipe is nominal as potential consumers know that it is out of the question to obtain priorities. Consequently many larger cast iron pipe projects have been postponed for the duration.

The Tacoma plant of the Seattle-Tacoma Shipbuilding Corp. has an additional contract for construction of an unstated number of new type aircraft carriers for the Navy. The yard in the last three years has built many cargo carriers for the Maritime Commission and also aircraft carriers and other naval craft. Continuous operation for an indefinite period is assured.

Boeing Aircraft Co. has adopted a new plan to insure a steady flow of parts for Flying Fortresses from branch plants, several of which will be established in convenient smaller cities. The first will be at Aberdeen, Wash., where 36,000 square feet have been leased. Others are in prospect at points where labor and other conditions are favorable. At Aberdeen 750 men and women will be employed. Equipment is being installed.

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MAN COOLERS
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SAVE VALUABLE WORK HOURS

Perkins Man Coolers keep men cool. Comfortable workers produce more. Give them a steady re-circulation of air.

Perkins Man Coolers are made in stationary and oscillating types, both portable.

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Renegotiation Act Lacks Changeover Provision

(*Concluded from Page 65*)

the war effort is going to suffer."

One witness who expressed entire satisfaction with the manner in which his company had been handled in renegotiation was C. B. Lanman, Ohio Nut & Washer Co., Steubenville, O. His company, he said, is well equipped for work in the postwar period and has financial reserves to carry it through the changeover period provided this is not too long. The main postwar problem of his company is the length of time it will have to wait for business from the automobile industry; hence he is much concerned with complaints by such industries that they are unable to keep such portion of their wartime profits as they feel they will require during the period of transition.

In contrast with these views set forth before the House Committee on Naval Affairs, is the view outlined by S. C. Allyn, president, National Cash Register Co., in a radio forum here last week. He prefers the contract renegotiation setup to the plan whereby his excess profits would pass to the government through excess profits taxes. He said he did not want his company's financial statements to show it was making "excessive" profits on its war contracts. He also discounted claims that renegotiation leaves a manufacturer uncertain what his income will be for any period. He said war always creates such an uncertainty.

In the meantime, Maurice Karker, chairman of the War Department Price Adjustment Board, and an experienced business man, declares "renegotiation is the best answer yet devised to that problem which has plagued every wartime President of the United States since George Washington.

"It is the best safeguard yet developed to see to it that the people's money is spent with intelligence and rigid economy and that they get a dollar's worth of value for every dollar spent."

Canada . . .

Toronto, Ont.—Under increased production schedules, Canada's steel output this year will provide two-thirds of all domestic requirements, leaving one-third to be imported from the United States. In 1942 approximately 50 per cent of all steel in Canada was imported, and imports for 1941 were about 60 to 65 per cent of requirements. C. D. Howe, minister of munitions and supply, estimated Canadian steel requirements for the 1943-44 fiscal year to total

EXTRA STORAGE WITH LESS LABOR!

Due to its extra low head room regardless of load variation, a compact Mansaver Grab will store an additional ton of sheets or similar material for every 4 sq. ft. of your present space. This would actually *enlarge* your storage!

Also—with a Mansaver Grab one man can handle in 3 hours the work it would take 6 men a full day to do. This would *enlarge* your force! Describe your lifting, shifting problem. We'll be glad to help you.

Other Mansaver Grabs are supplied for handling other materials.

COMPLETE YOUR CRANES WITH

MANSAVER GRABS

THE J-B ENGINEERING SALES CO. EAST ST., NEW HAVEN, CONN.

Industrial

DIAMOND TOOLS

The STA-KOOL Single-Point Tool is equipped with internal coolant ducts and external cooling fins to quickly dissipate the heat, thus prolonging tool life.

SMITITE Diamond Dressing Tools employ a sintered metal setting, which firmly holds the stones till they are completely consumed.

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IS SERVING TO INCREASE PRODUCTION IN WAR PLANTS ALL OVER THE COUNTRY. IT IS BEING USED IN THE CLEANING OF CASTINGS, FORGINGS, HEAT TREATED METAL PARTS, SHELLS, BOMBS AND ARMOR PLATE. "CLEANBLAST" MAINTAINS PRODUCTION AND CONSISTENTLY REDUCES CLEANING ROOM COSTS.

ALLOY METAL ABRASIVE COMPANY

311 W. HURON ST. ANN ARBOR, MICHIGAN

5,000,000 tons, against steel ingot capacity of approximately 3,200,000 tons. The Canadian pig iron capacity is sufficient for all requirements and within the next month or two, when new furnaces go into production, the annual capacity will total about 2,500,000 tons.

New order placing continues to favor the heavier lines of steel. A large part of new bookings are for plates, on shipbuilding account, and plate imports show no indication of falling off. In addition to steadily increasing plate demand for ship construction, orders are pouring in for plates for motorized vehicle construction and heavy buying also is reported from boiler makers. Comparatively few orders are reported on rolling stock building account, due to the fact that contracts already have been placed and allocations are being made under direction of the steel controller.

Merchant bar orders continue in good volume, with increased inquiry from civilian users. Releases to non-war consumers have improved recently, mainly to agricultural implement makers and for production of electrical equipment, but mill officials state there are no surplus stocks of carbon or alloy bars. Machine tool builders are taking less material than a year ago although there has been some minor increase in demand from this quarter in the past week or two. On bar orders delivery dates are being pushed nearer to the end of the year, while mill backlogs continue to expand.

Structural shapes are attracting practically no interest, and most new orders call for lots of 50 to 100 tons, with total sales for the week running less than 1000 tons. While several building jobs are planned to start within the next month or six weeks, most will be built without use of steel shapes. Production of small shapes for shipbuilding is well sustained and new orders are appearing on this account.

Merchant pig iron sales dipped below 5000 tons for the week, partly due to the fact that most melters already have covered for immediate needs and improvement in the scrap supply has enabled melters to reduce pig iron in their melt. Also there has been some slowing in grey iron foundry operations recently. Demand for malleable iron is holding fairly steady and accounted for about 3000 tons of the week's sales. Basic iron sales fell into a slump with only about 200 tons reported.

Scrap iron and steel receipts have increased, due to the local salvage drive which brought out about 3000 tons of old metals. Dealers state that incoming scrap is holding at a good level and they have been gradually increasing deliveries to steel mills and electric furnaces.

Steel in Europe . . .

London — (*By Radio*)—Demand for steel sheets is quieter in Great Britain but requirements are heavy for light structural steel for war contract work, especially for shipbuilding. The supply position in semifinished steel is being improved. Scrap outlook is favorable and receipts are sufficient to maintain high steel output.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Borg-Warner Corp., Detroit, plant facilities in Illinois, costing $410,000.

Drexel Furniture Co., Morganton, N. C., plant facilities in North Carolina, costing $175,000.

P. R. Mallory & Co. Inc., Indianapolis, additional equipment for plant in Indiana, costing $50,000. Overall commitment now $2,600,000.

Pittsburgh Steel Co., Pittsburgh, additional facilities at plant in Pennsylvania, costing $450,000. Overall commitment now $1,500,000.

Republic Steel Corp., Cleveland, $875,000 for additional plant facilities in Ohio, making overall commitment $4,775,000.

Diamond Alkali Co., Pittsburgh, $2,700,000 for additional facilities for a subsidiary in Ohio, bringing overall commitment to $18,700,000.

Mathieson Alkali Works Inc. New York, $11,000,000 for additional plant facilities in Louisiana, resulting in overall commitment of $45,700,000.

Ford Motor Co., Detroit, $3,300,000 for additional plant facilities in Michigan, making overall commitment $82,600,000.

Owens-Corning Fiberglas Corp., Toledo, O., $530,000 for additional equipment for plants in Ohio, Rhode Island and Pennsylvania, making overall commitment $2,350,000.

Sirian Wire & Contact Co., Newark, N. J., for machinery and equipment for a plant in New Jersey, at cost of $175,000.

Santiam Flax Growers, Jefferson, Oreg., for new plant facilities in Oregon, costing $165,000.

Reynolds Metals Co., Louisville, Ky., for plant facilities in Kentucky, costing $850,000.

Camfield Mfg. Co., Grand Haven, Mich., for additional plant facilities in Michigan, costing $50,000, making overall commitment $170,000.

These days the hungry mouths of America's blast furnaces can use every bit of scrap iron and steel they can get—and more. But they don't want good tool steel that has ended prematurely on the junk heap through carelessness and faulty grinding.

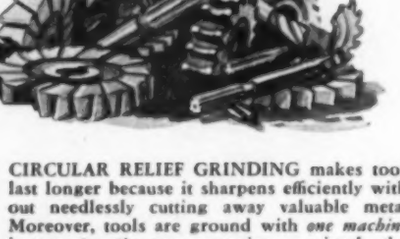
Now's the time to take a good critical look at your tool-sharpening operations. Are they modern, up-to-date? Do they conserve and protect the life of your precious tools?

Grind the CIRCULAR RELIEF way

SAVE TOOLS TO HELP SAVE AMERICA

CIRCULAR RELIEF GRINDING makes tools last longer because it sharpens efficiently without needlessly cutting away valuable metal. Moreover, tools are ground with *one machine*, in *one operation*—an operation so simple that inexperienced men can handle it.

Take a look at the diagram below for a comparison between CIRCULAR RELIEF GRINDING and conventional methods. Then send for our free folder telling the whole story. Do it *today*. Start conserving your precious tools *now!*



Comparing CIRCULAR RELIEF With Conventional Grinding

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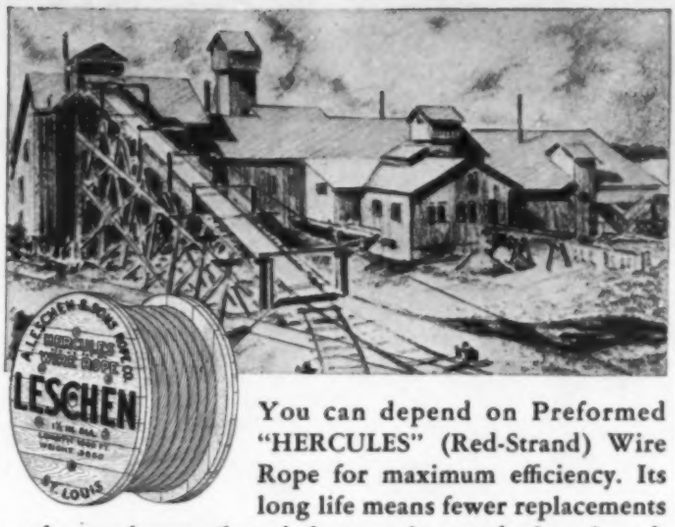

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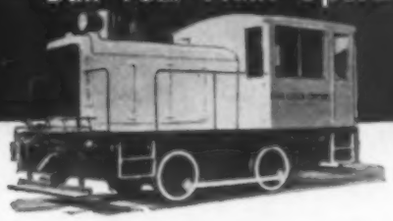

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Vega Aircraft Corp., Burbank, Calif., for a plant in California costing $1,850,000, making overall commitment $7,000,000.

Ballofet Dies & Nozzle Co., Guttenberg, N. J., contract to provide additional equipment for plant in New Jersey.

Granite City Steel Co., Granite City, Ill., for additional facilities for a plant in Illinois, to cost $50,000, bringing overall commitments to $10,750,000.

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—Permits have been granted for operation of three light machine shops for the duration. S. Yenson, 421 Lombard avenue, Cuyahoga Falls, will operate at 927 North Main street; Guy Richard, 771 May street, at that location; R. W. Raper, 1745 Seventh street, Cuyahoga Falls at 1231 West Waterloo road.

CANTON, O.—Barium Stainless Steel Corp., 1502 Allen street, has acquired 24 mining claims in Pennington county, South Dakota, for production of tin, tungsten, mica and beryllium ores. The company also has under development a new type of ice-making machine, a demonstration model now being under refinement.

CLEVELAND—Champion Rivet Co., Harvard avenue and East 108th street, T. Pierre Champion, president, plans erection of a new garage building to cost $4000.

CLEVELAND—Electro Metals Inc., 2010 East Seventy-first street, has sold plant and machinery to Sylvania Electric Products Inc., New York, which will continue production at the same address.

CLEVELAND—Industrial Electronics Inc., Gerald Richland, attorney, 322 Leader building, is being organized to manufacture, service and deal in sound equipment and electronic devices, by Gerald Richland, J. M. Havern and Nathan R. Stone.

CLEVELAND—Champion Machine & Forging Co., 3695 East Seventy-eighth street, has plans by McGeorge & Hargett, 9400 Quincy avenue, for a two-story and basement plant building 80 x 200 feet, to cost $150,000. (Noted June 14.)

CLEVELAND—General Electric Co., Cleveland wire works division, 1311 Chardon road, Euclid, O., is starting an expansion program with a factory building 120 x 270 feet, to cost $161,000; an ore storage building costing $12,000 and an addition 43 x 43 feet, costing $3000.

NEWCOMERSTOWN, O.—Food Service Co., now in process of formation, plans to convert existing structure and build an addition, for use as a vegetable dehydrating plant.

NEWTON FALLS, O.—Village, H. S. Hoag, clerk, has plans under way for waterworks improvements, including intake line to river, low-service pumping station, water treatment plant and chemical feed equipment. Cost estimated at $80,000. Rollin F. MacDowell, Chester-Twelfth building, Cleveland, is engineer.

TIFFIN, O.—Cleveland Quarries Co., Guildhall building, Cleveland, plans for two additions to its Sterling Grinding division, 70 x 290 feet to house 170-foot tunnel kiln. Cost will be over $100,000.

MASSACHUSETTS

EAST BOSTON, MASS.—Mystic Steamship division of Eastern Gas & Fuel Corp., F. B. Craven, manager, Lewis Wharf, Boston, has let contract for machine shop, carpenter shop and fabricating units, on Border street, to F. Leroy Fox Inc., 101 Milk street, Boston. Cost is estimated at $155,000.

RHODE ISLAND

WOONSOCKET, R. I.—Branch River Woolen Co. is preparing to let contract for coal unloading facilities, including railway trestle, storage and handling equipment. Lockwood-Greene Co., 10 Rockefeller Plaza, New York is engineer.

NEW JERSEY

JERSEY CITY, N. J.—Standard Heater & Oil Equipment Co., 245 Cornelison avenue, will build a one-story 60 x 140-foot assembly building, two-story 40 x 100-foot utility building, costing about $75,000.

MICHIGAN

ADRIAN, MICH.—City plans construction of a water filtration and pumping plant, to cost about $200,000. Finbeiners, Pettis & Strout, 725 Nicholas building, Toledo, O., are engineers.

HAMTRAMCK, MICH.—Serv-Well Tool & Machine Co., 12000 Mitchell avenue, has been incorporated with $4000 capital by Peter Gleneski, 12000 Mitchell avenue, to deal in tools, dies and machinery.

LANSING, MICH.—Lansing Paint & Color Co., Glenrose, Mich., will let contract soon for ten one-story factory buildings costing $200,000. Black & Black, 706 Capital Savings & Loan building, Lansing, are architects.

ILLINOIS

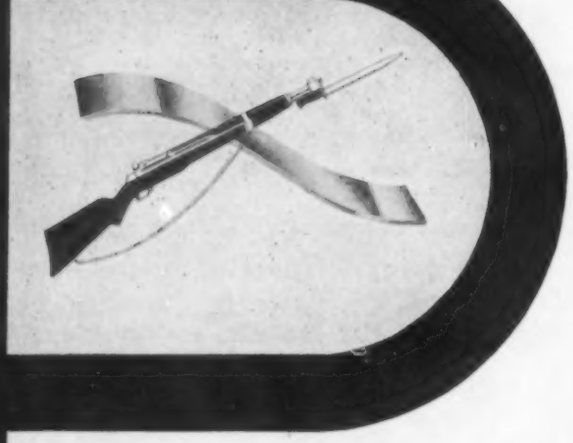
CHICAGO—Atlas Pattern Works, formerly at 3001 West Carroll avenue, has bought a one-story building at 4530 West Harrison street, containing 18,000 square feet floor space, to provide for expansion of activities.

CHICAGO—Industrial Filter & Pump Mfg. Co. has bought a two-story building at 1621 West Carroll avenue, containing about 18,000 square feet floor space, which will be used for war production, representing an expansion over former facilities at 3017 West Carroll avenue.

CICERO, ILL.—Brad Foote Gear Works, 1301 South Cicero avenue, has increased capacity by several plant additions.

MARYLAND

FAIRFIELD, MD.—Bethlehem-Fairfield Shipyards Inc., 1101 Key highway, Baltimore, will let contracts soon for power plant alter-



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GEORGIA

THOMASVILLE, GA.—United States engineer, Savannah, Ga., is taking bids for a sewage disposal plant in Thomas county.

LOUISIANA

BATON ROUGE, LA.—Interstate Natural Gas Co. Inc. has represented to Federal Power Commission that compressors are needed to supply gas for new synthetic rubber and aluminum plants in Baton Rouge and asks permission to build 16-inch pipeline connecting gas fields and facilities.

MISSOURI

ST. LOUIS—Curtis Wright Corp., Lambert field, has let contract to Mahoney-Troost Construction Co., St. Louis, for addition to engineering building at Municipal Airport, to cost about $100,000.

ST. LOUIS—Interstate Carrier Corp., eastern division, E. D. Hicks Jr., superintendent, plans improvements, including boiler house, engine house, condenser buildings and new motor freight terminal.

ST. LOUIS—Blanton Co., 3400 North Wharf street, will take bids soon on the superstructure of a one-story soybean processing plant. Gray & Pauley, 3800 West Pine street, St. Louis 8, are architects.

ST. LOUIS—John Ramming Machine Co., 4591 McRee avenue, has let contract for one-story 29 x 181-foot machine shop addition to F. Koenig, 3918 Bowen street, at estimated cost of $40,000, including equipment. (Noted June 21.)

WISCONSIN

MADISON, WIS.—Monarch Machine Co. has let contract to Vogel Bros. Building Co., for a one-story plant addition.

SHEBOYGAN, WIS.—Hayssen Mfg. Co., manufacturer of bread-wrapping machinery and similar products, plans construction of a one-story plant addition 40 x 116 feet. E. A. Stubenrauch is architect.

WEST ALLIS, WIS.—Bayley Blower Co., manufacturer of blowers, heaters, etc., has started construction of a one-story shop addition.

WEST ALLIS, WIS.—Wehr Steel Co. has let contract to W. W. Oeflein Inc. for a one-story pattern storage building 60 x 209 feet. Henry I. Messmer, 231 West Wisconsin avenue, Milwaukee, is architect.

MINNESOTA

MINNEAPOLIS—Perfection Mfg. Corp., manufacturer of vacuum pumps and milking machinery, has let contract to B. H. Stahr Co., Wesley Temple building, for a one-story plant addition.

PARKERS PRAIRIE, MINN.—Parkers Prairie Co-operative Creamery Association is having plans made by Klinger, Hubbard & Gohn, engineers and architects, 218 South Barstow street, Eau Claire, Wis., for a two-story boiler room 29 x 45 feet and 16 x 57-foot receiving room.

IOWA

AMANA, IOWA—Amana Society, Peter Stuck, secretary, manufacturer of commercial refrigeration equipment and portable field refrigeration units for the army, plans to rebuild plant destroyed by fire June 8, with loss of about $225,000.

CEDAR RAPIDS, IOWA—Iowa Mfg. Co., manufacturer of rock and gravel crushing machinery, has let contract to Loomis Bros. for a one-story plant addition and improvements to present building. (Noted May 31.)

ARIZONA

PHOENIX, ARIZ.—Defense Plant Corp. has approved an additional $450,000 for plant expansion at the Goodyear Aircraft Co. plant, including a radio communications building, control tower, paving and special facilities, with 6000 feet of runways and two shorter runways.

IDAHO

IDAHO FALLS, IDAHO—Western Gold Exploration Co. suffered loss of its $60,000 mill by fire. Plant, located 12 miles from Stanley, Idaho, was completed last year but was closed for the duration.

CALIFORNIA

BURBANK, CALIF.—Plans are being drawn for a four-story addition to Building A-1 of the Lockheed Aircraft Corp., on Victory place, 50 x 259 feet.

CULVER CITY, CALIF.—Oliver Machine Works, 3520 Helms avenue, is building an addition 26 x 90 feet, to cost about $4000.

HERMOSA BEACH, CALIF.—Hi-Shear Rivet Tool Co. has been formed by George S. Wing and Allen J. Kirk to conduct business at 539 Pier avenue.

LOS ANGELES—McCullough Tool Co. is building an office addition at 5815 South Alameda street, to cost $4000.

LOS ANGELES—Winston Copper Co. has been incorporated with $25,000 by Wayne Loel, William O. Maxwell and W. E. Hunt, all of Los Angeles. Thomas J. Kelly, 506 Los Angeles Stock Exchange building, is representative.

PASADENA, CALIF.—Action Welding & Machine Co. has been formed by David F. Jorgensen and J. H. Malcomb to conduct business at 1778 East Colorado street.

WASHINGTON

COLVILLE, WASH.—Northport Mining & Milling Co-operative Inc. has been formed by Delbert R. Scoles and associates to pool output of a number of mines producing strategic materials. Efforts will be made to obtain government financial assistance for construction of a mill.

OLYMPIA, WASH.—Machine shop operated by Delta V. Smyth was burned recently, heavy machinery in shop and warehouse being destroyed. The shop was used to service a fleet of tugs.

SEATTLE—S. E. Sagstad plans addition 47 x 112 feet to his boat-building plant at 5031 Thirtieth avenue N.W. Plant builds small wooden cruisers and fishing vessels.

SEATTLE—Seattle Shipbuilding & Dry Dock Co., 2629 West Fifty-fourth street, engaged in building minesweepers and other naval craft, plans a $15,000 plant mold loft 48 x 168 feet. Claire Moffitt is architect.

SEATTLE—Smithway Machine Co., manufacturer of machinery, has given contract to H. E. Carlbom for a one-story plant addition 55 x 100 feet. William C. Brust, Republic building, is architect.

CANADA

HAMILTON, ONT.—Canada Iron Foundries Ltd., Stuart street, has given general contract to W. H. Cooper Construction Co. Ltd., Medical Arts building, for a plant addition, one story, 28 x 50 feet, costing about $30,000, with equipment.

NIAGARA FALLS, ONT.—Oneida Community Ltd., Ontario road, has given general contract to Smith Bros. Construction Co. Ltd., 1740 Ellen avenue, for three new plant buildings, estimated to cost $18,000, with equipment additional. Work to start at once.

ST. CATHERINES, ONT.—McKinnon Industries Ltd., Ontario street, has taken bids through A. E. Nicholson, 46 Queen street, architect, and will let contracts soon for a foundry building addition, estimated to cost about $40,000, with equipment.

TORONTO, ONT.—Precision Tool Works Ltd., 3555 Danforth avenue, R. Homer, president, has had plans prepared and will ask bids soon for a plant building at 49 Niagara street, 50 x 100 feet, to cost, including equipment, about $40,000.

TORONTO, ONT.—Aluminum Co. of Canada Ltd., head office in Sun Life building, Montreal, Que., has had plans prepared by J. G. Meadowcroft, 1154 Beaver Hall Hill, Montreal, Que., for a plant addition to cost, with equipment, about $100,000, at 158 Sterling road, Toronto, Ont.

SHERBROOKE, QUE.—Superheater Co. Ltd., Drummond street, has let general contract to Newton Construction Co. Ltd., 150 Victoria street, for a plant addition to cost, with equipment, about $50,000.

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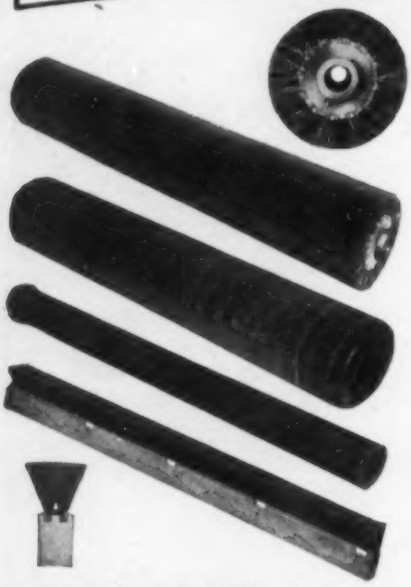

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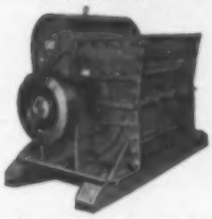

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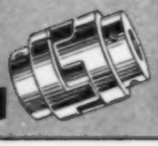

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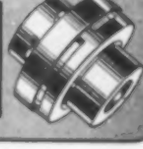

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★ ★ ★

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YOUR LIFTING MAGNET and ITS JOB IN THIS WAR!

With your lifting magnet you are handling iron and steel, the material they make guns and battleships and tanks and shells out of. Every time you lift a load, you help to put more rifles in the hands of American soldiers, more battleships on the ocean . . . or build something to help bring peace back sooner and soldiers back safely. Five minutes saved in your work over here may mean only time for a smoke for you. But it may mean the difference between life and death for some "buddy" of yours . . . over there.

So make your magnet lift more, work faster and last longer for the sake of the men in uniform, your country and yourself. Here's how:

HOW TO MAKE YOUR MAGNET LIFT MORE AND WORK FASTER

An operator who knows his business can handle more tonnage with an old magnet than a "green" man with a new up-to-date magnet.

HERE ARE 5 RULES EXPERIENCED OPERATORS FOLLOW

KEEP POWER OFF ON THE RETURN TRIP

The "juice" heats the magnet and a hot magnet will not carry as much as a cool magnet. So discharge the load fast, keep the current "off" during the return trip, keep the magnet cool.

KEEP POWER OFF UNTIL MAGNET SETTLES ON PILE

If you don't, smaller pieces will jump up to magnet and block off the rest so that you can't get a full load.

WORK ON DEEP PILES . . . YOU GET A BIGGER LOAD

The magnetism has a chance to take a full deep "bite" out of the pile.

after you turn power on, let magnet set for 5 seconds (5) to 10 seconds (65)

This lets magnetism build up to peak and gives you a maximum load on every trip. Here—"Haste makes waste."

MAKE ONE BIG PILE OUT OF SEVERAL LITTLE PILES

When only little piles are left, use the magnet to gather them together in one BIG pile. One big load trip is 3 times as fast as three small loads trips.

HOW TO MAKE YOUR MAGNET LAST LONGER

One thing about an experienced operator—his magnet lasts years longer and gives far less trouble. That's important when steel and copper (the materials magnets are made of), and the manpower to repair magnets are so scarce.

HERE ARE 8 MAINTENANCE RULES THE EXPERIENCED OPERATOR FOLLOWS:

DON'T USE MAGNET AS SKULL-CRACKER

Many magnets don't wear out. They are broken—by careless handling. Don't drop a magnet to break up heavy pieces of scrap or to loosen a frozen ingot. Use it only for lifting.

SET YOUR MAGNET DOWN EASY

A 65-inch magnet costs $3600. Repairs to broken magnets have cost up to $2000 and use up precious time, repair parts and manpower. EASE your magnet down on to the pile.

KEEP TERMINAL BOX CLOSED

Keeps moisture away from terminals and protects them against breakage. If cover is lost, get a new one.

DON'T USE MAGNET AS A BATTERING RAM

You may break a pole shoe, a terminal box, damage the windings or rupture the insulation inside the magnet. Use the magnet only for lifting.

KEEP BOLTS TIGHT

And replace broken bolts. Helps to keep moisture out, protects pole shoe against mechanical shock and helps to keep lifting power at maximum.

GREASE CHAIN LINKS AND KEEP 'EM GREASED

Chain links constantly rub against each other causing friction and wear. Keep the links greased, keep friction down and your chains will last much longer thus saving critical materials.

KEEP MAGNET DRY

Do not coal or paint with watery oils protect in storage. The average magnet left on the ground absorbs moisture which causes short circuits and cripples its lifting power. Always store magnets where it is dry . . . on a low platform or on blocks.

WHEN HANDLING HOT MATERIALS

Watch magnet temperature carefully, and switch to spare magnet to avoid overheating.

REPORT OPERATING TROUBLES TO MAINTENANCE FOREMAN AT ONCE

Adv. MA-20

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